DOCUMENT RESUME

ED 213 279 HE 014 558

AUTHOR	Maxfield, Betty D.
TITLE	Employment of Minority PhDs: Changes over Time. Survey of Doctorate Recipients.
INSTITUTION	National Academy of Sciences - National Research Council, Washington, D.C. Commission on Human Resources.
SPONS AGENCY	National Endowment for the Humanities (NFAH), Washington, D.C.; National Science Foundation, Washington, D.C.
PUB DATE	81
NOTE	77p.
AVAILABLE FROM	Survey of Doctorate Recipients Office, Commission on Human Resources, National Research Council, 2101 Constitution Avenue, N.W., Washington, DC 20418.
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Academic Rank (Professional); Asian Americans; Behavioral Sciences; Biological Sciences; *Career Choice; Comparative Analysis; *Doctoral Degrees; Employment Level; *Employment Opportunities; Engineering; Ethnic Groups; Graduate Surveys; Higher Education; Humanities; *Immigrants; *Minority Groups; Occupational Surveys; Racial Differences; Salaries; Sciences; Tenure; *Vocational Followup; Whites

ABSTRACT

Data on the employment status of Ph.D.s in the United States, with emphasis on racial minorities, are presented. The information is based primarily on the 1979 Survey of Doctorate Recipients but also is derived from the annual Surveys of Earned Doctorates. Demographic and employment statistics for the total population of Ph.D.s in science, engineering, and the humanities are presented, and U.S.-born and foreign-born doctorate recipients are treated separately. Other tables describe the pattern of academic employment among the racial/ethnic groups, including such variables as academic rank and tenure; the pattern of nonacademic employment of Ph.D.s in these fields; and the pattern of remuneration of science, engineering, and humanities Ph.D.s by racial/ethnic group, in both academic and nonacademic employment. Findings include the following: of the 395,000 science, engineering, and humanities Ph.D.s in the United States in 1979, 2.4 percent were U.S.-born minorities and 5.7 percent were foreign-born minorities; of these minority Ph.D.s, 88.6 percent were in science/engineering fields and 11.4 percent were in humanities fields; Asian/Pacific Islanders accounted for 69.3 percent of all science/engineering minority Ph.D.s; the biological and behavioral sciences (psychology and social sciences) accounted for about 60 percent of the science/engineering Ph.D. degrees earned by U.S.-born minorities, and only 48 percent of those held by U.S.-born whites; and 37 percent of all minority Ph.D.s in the humanities had earned their degrees in modern languages and literature. A sample questionnaire and information on the research methodology are appended. (SW)

Employment of Minority PhDs: Changes over Time

BETTY D. MAXFIELD
Project Director

Survey of Doctorate Recipients
COMMISSION ON HUMAN RESOURCES
NATIONAL RESEARCH COUNCIL

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
National Research Council
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

NATIONAL ACADEMY PRESS
Washington, D.C. 1981

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institutes of Medicine.

This report has been reviewed by a group other than the author according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

The National Research Council was established by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and of advising the federal government. The Council operates in accordance with general policies determined by the Academy under the authority of its congressional charter of 1863, which establishes the Academy as a private, nonprofit, self-governing membership corporation. The Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in the conduct of their services to the government, the public, and the scientific and engineering communities. It is administered jointly by both Academies and the Institute of Medicine. The National Academy of Engineering and the Institute of Medicine were established in 1964 and 1970, respectively, under the charter of the National Academy of Sciences.

Copies available from:

Survey of Doctorate Recipients Office
Commission on Human Resources
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Acknowledgments

This report presents data on the employment status of Ph.D.s in the United States with special emphasis on members of racial minority groups. The report is based primarily on data from the 1979 Survey of Doctorate Recipients (SDR), but also includes data from the annual Surveys of Earned Doctorates. The SDR is conducted under the auspices of the Commission on Human Resources (CHR) of the National Research Council. Support for the project was provided by the National Science Foundation and the National Endowment for the Humanities.

Dr. Alan Boneau, consultant to the project, along with Richard Albert and Phillip Rosen, members of the CHR staff, provided many helpful suggestions during the initial drafting of the report. Betty Maxfield, Project Director of the SDR, was responsible for developing the report outline and drafting the final report. Susan Henn, SDR Staff Associate, was primarily responsible for compiling the summary statistics and reviewing the various drafts of the report. Jean Savage, technical editor, assisted with the drafting of the Highlights, and helped in making final emendations to the report. Elizabeth McClung, Project Secretary, was responsible for typing the report.

Mario Molina and Cleveland Dennard, members of the Commission on Human Resources, and William C. Kelly, Executive Director of the Commission, reviewed the report and provided useful suggestions for revisions. Members of the Panel on Data Concerning the Education and Employment of Humanities Doctorate Recipients also reviewed the report and provided suggestions for increasing its clarity. The panelists were: Ernest Frerichs, Chairman, Brown University; Patricia Spacks,

Yale University; Frank Snowden, Howard University; Conrad Snowden, Yale University; Richard Brod, Modern Language Association; Vere Chappell, University of Massachusetts; Johanna Mendelson, American Association of University Women. J. James Brown and John Scopino of the National Science Foundation and Arnita Jones of the National Endowment for the Humanities provided constructive advice on the report outline.

To these individuals and all others who aided in the preparation of the report, the Commission expresses its sincere thanks and appreciation.

Betty D. Maxfield
Director
Survey of Doctorate Recipients

Contents

Highlights.....ix

Chapter 1 - Introduction..... 1

Chapter 2 - Demographic Characteristics..... 9

Chapter 3 - Academic Employment.....21

Chapter 4 - Nonacademic Employment.....35

Chapter 5 - Salaries.....47

Appendices

Appendix A - 1979 Survey of Doctorate Recipients Questionnaire.....57

Appendix B - Weighting Procedure.....62

Appendix C - Sampling Error Estimates.....65

Text Figures

Figure A - Racial/Ethnic Minority Ph.D.s by Year of Degree, as a Percentage of the Total Population in the Cohort.....11

Text Tables

Table 1.1 - Response Rates of Science, Engineering and Humanities Ph.D.s in the 1979 Survey of Doctorate Recipients..... 4

Table 2.1 - Science, Engineering, and Humanities Ph.D.s in the United States, with Percentages, by Year of Ph.D. and Racial/Ethnic Category.....10

Table 2.2 - Science, Engineering, and Humanities Ph.D.s in the United States, with Percentages, by Sex, Year of Ph.D., and Racial/Ethnic Category.....12

Table 2.3A - Science and Engineering Ph.D.s in the United States, with Percentages, by Year of Ph.D., Ph.D. Field, and Racial/Ethnic Category.....14

Table 2.3B - Humanities Ph.D.s in the United States, with Percentages, by Year of Ph.D., Ph.D. Field, and Racial/Ethnic Category.....14

Table 2.4A - Science and Engineering Ph.D.s in the United States, with Percentages, by Ph.D. Field and Racial/Ethnic Category.....16

Table 2.4B - Humanities Ph.D.s in the United States, with Percentages, by Ph.D. Field and Racial/Ethnic Category.....17

Table 2.5 - Employment Status of Science, Engineering, and Humanities Ph.D.s in the U.S. Labor Force.....18

Table 2.6 - Withdrawal and Unemployment Rates for Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category.....19

Table 3.1 - Percentage of Academically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category.....22

Table 3.2 - Percentage of Academically Employed 1960-78 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category.....22

Table 3.3 - Academically Employed Science, Engineering, and Humanities Ph.D.s with Percentages by Field of Ph.D. and Racial/Ethnic Category.....25

Table 3.4A - Percentage of Academically Employed Science and Engineering Ph.D.s by Field of Ph.D. and Racial/Ethnic Category.....27

Table 3.4B - Percentage of Academically Employed Humanities Ph.D.s by Field of Ph.D. and Racial/Ethnic Category.....28

Table 3.5 - Primary Work Activity as Reported by Academically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category.....30

Table 3.6 - Tenure Status of Academically Employed 1960-78 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category.....31

Table 3.7A - Academic Position Held by 1960-78 Science and Engineering Ph.D.s by Year of Ph.D. and Racial/Ethnic Category.....32

Table 3.7B - Academic Positions Held by 1960-78 Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category.....33

Table 4.1 - Percentage of Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category.....36

Table 4.2 - Percentage of Nonacademically Employed 1960-1978 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category.....36

Table 4.3 - Nonacademically Employed Science, Engineering, and Humanities Ph.D.s, with Percentages, by Ph.D. Field and Racial/Ethnic Category.....38

Table 4.4A - Percentage of Nonacademically Employed Science and Engineering Ph.D.s by Field of Ph.D. and Racial/Ethnic Category.....40

Table 4.4B - Percentage of Nonacademically Employed Humanities Ph.D.s by Field of Ph.D. and Racial/Ethnic Category.....41

Table 4.5 - Employment Sector of Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category.....43

Table 4.6 - Primary Work Activity as Reported by Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category.....44

Table 5.1 - Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Field of Doctorate and Racial/Ethnic Category (in thousands of dollars).....48

Table 5.2 - Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Academic Rank and Racial/Ethnic Category (in thousands of dollars).....49

Table 5.3 - Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Years of Professional Experience and Racial/Ethnic Category (in thousands of dollars)...50

Table 5.4 - Median Annual Salaries of Full-Time Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Type of Employer and Racial/Ethnic Category (in thousands of dollars).....52

Table 5.5 - Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Years of Professional Experience and Racial/Ethnic Category (in thousands of dollars).....53

Table 5.6 - Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Field of Doctorate and Racial/Ethnic Category (in thousands of dollars).....54

Table 5.7 - Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category (in thousands of dollars).....54

Table 5.8 - Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Sex and Racial/Ethnic Category (in thousands of dollars)...55

Appendices Tables

Table B.1 - Classification of Sample and Weighting for 1979 Survey of Doctorate Recipients.....64

Table C.1 - Approximate Sampling Errors for Various Statistics and Sample Sizes.....67

Table C.2 - Sample Sizes of Selected Variable Bases of Science, Engineering, and Humanities Ph.D.s in the U.S. in 1979.....69

Highlights

- Of the 395,500 science, engineering, and humanities Ph.D.s in the United States in 1979, 9,300 (2.4 percent) were U.S.-born minorities and 22,600 (5.7 percent) were foreign-born minorities.

- Of these minority Ph.D.s, 28,300 (88.6 percent) were in science/engineering fields and 3,600 (11.4 percent) were in humanities fields.

- The majority of the science/engineering minority Ph.D.s were foreign-born, 21,200 (75.0 percent). These Ph.D.s were predominantly Asian/Pacific Islanders who numbered 19,600 or 69.3 percent of all science/engineering minority Ph.D.s.

- Approximately 91 percent of the science, engineering, and humanities Ph.D.s earned by minorities were awarded in the 1960s and 1970s, compared with 78 percent for the total population of Ph.D. recipients.

- The most rapid rates of growth occurred among female minority Ph.D.s. For example, women earned only 10 percent of the Ph.D.s in science/engineering awarded to U.S.-born minorities in the 1960s, but earned 23 percent of the science/engineering Ph.D.s awarded to U.S.-born minorities in the 1970s.

- The biological and behavioral sciences (psychology and the social sciences) accounted for approximately 60 percent of the science/engineering Ph.D. degrees earned by U.S.-born minorities, and only 48 percent of those held by U.S.-born whites.

- The percentage of foreign-born minorities with Ph.D.s in engineering was more than double that of U.S.-born whites, and more than five times that of U.S.-born minorities.

- As many as 1,300 or 37 percent of all minority Ph.D.s in the humanities had earned their degrees in modern languages and literature.

- The unemployment rate of U.S.-born minority Ph.D.s in science and engineering (2.2 percent) was more than twice that of U.S.-born whites (0.8 percent).

- U.S.-born minority Ph.D.s were employed primarily in academic settings, 60 percent for the scientists/engineers and 82 percent for the humanities, but the analysis of the 1960s and 1970s graduates suggests that minorities and whites may be moving away from academic employment.

- With the exception of minority humanities Ph.D.s in academic employment, the median salaries were generally higher for whites than for minorities. Male Ph.D.s had higher median annual salaries than female Ph.D.s in all employment settings. Salaries for Ph.D.s employed in nonacademic jobs were generally higher than those for Ph.D.s in academic jobs.

1
Introduction

Ever since the Civil Rights Act of 1964, the United States has been pursuing the goal of equality of educational and employment opportunities for all its citizens. This effort to foster equality and eliminate discriminatory practices against minority groups has included legislation, federal regulations, executive orders, and judicial decisions. Concomitantly, various programs have been established to increase the employment and education opportunities of certain minority groups, with similarly various results.

The many problems inherent in addressing such a broad social goal in the labor force, or any other area of society, demand sound decision making. And reliable data are required as a foundation for decision making, whether on the part of federal and state policy analysts, equal opportunity and affirmative action administrators, or career counselors.

The data collected for the present report are an example of this type of reliable and useful background information. It is presented as an overview of the demographic and employment characteristics of minority Ph.D.s in science, engineering, and humanities through a comparison of minorities with whites.

DATA COLLECTION

The source of the data is the 1979 Survey of Doctorate Recipients (SDR), which was the fourth of these biennial surveys conducted by the Commission on Human Resources of the National Research Council (CHR-NRC) under the sponsorship of the National Science Foundation, the National

Endowment for the Humanities, the National Institutes of Health, and the Department of Energy. In 1973 and 1975, the Surveys covered only science and engineering Ph.D.s, but in 1977 and 1979, they were augmented to include humanities Ph.D.s. The results have been published in various reports, which summarize the data from each Survey or focus on special topics of interest.[1]

The 1979 SDR sample was selected from a roster of 438,100 Ph.D.s in science, engineering and the humanities who had earned their doctorates between January 1, 1936, and June 30, 1978. The roster was developed primarily from the National Research Council's Doctorate Records File (DRF).[2] The sample was stratified by:

1) Field of doctorate or field of employment for scientists and engineers.
2) Year in which the Ph.D. was awarded.
3) Degree category (i.e., U.S. doctorate recipients in the sciences, engineering, and the humanities; U.S. doctorate recipients in education or professional fields who were employed in science or engineering; or recipients of doctorates from foreign institutions who were employed in the United States as scientists or engineers).
4) Sex.
5) Racial/ethnic identification.
6) Citizenship.

---

[1] Commission on Human Resources, National Research Council. (1980, 1978, 1976, 1974) Science, Engineering, and Humanities Doctorates in the United States, 1979, 1977, 1975, 1973 Profiles. Washington, D.C.: National Academy of Sciences. Maxfield, Betty D., and Spisak, Andrew W. (1979) Ph.D.s in Business and Industry. Washington, D.C.: National Academy of Sciences. Maxfield, Betty D., and Henn, Susan. (1980) Employment of Humanities Ph.D.s: A Departure from Traditional Jobs. Washington, D.C.: National Academy of Sciences.

[2] The Doctorates Records File is based on the CHR's annual Survey of Earned Doctorates, an ongoing compilation of information taken from the questionnaires completed by all new Ph.D. recipients in U.S. universities. The DRF presently includes data on the 630,000 doctorate recipients of the past 60 years.

A variable sampling rate was designated for each category in order to provide sufficiently large samples for certain subgroups of the population. Within each subgroup a simple random sample was selected.

The 1979 survey sampling rate of 11.8 percent yielded a sample of 51,711 individuals. This number was reduced by dropping 2,040 individuals who were deceased or otherwise outside the scope of the survey. Of the remaining 49,671, 298 explicitly declined to participate in the survey; 3,677 were not mailed questionnaires because valid addresses could not be obtained; and 12,819 were presumably contacted but did not return their questionnaires. This means a total of 32,877 individuals responded (a response rate of about 66 percent of the 49,671 in the survey sample or 72 percent of the 45,994 presumed to have been contacted). Table 1.1 shows the response rates for the 1979 survey sample across the various stratification variables. Data from the responses in each stratum were weighted separately to produce estimates for the total population.[3]

LIMITATIONS OF THE DATA

The estimates presented in this report are subject to nonsampling and sampling errors.

Nonsampling error may arise from such sources as misinterpretation of questions by respondents, errors in coding and processing the responses given by sample members, and bias from failure to respond to the survey.[4]

---

[3]Weighting procedures for the 1979 SDR are described in Appendix B.

[4]The issue of nonresponse bias is discussed in Maxfield, Betty D., et al. (1980) Item Response Analysis: 1979 Survey of Doctorate Recipients. Washington, D.C.: National Academy Press.

TABLE 1.1 Response Rates of Science, Engineering, and Humanities Ph.D.s in the 1979 Survey of Doctorate Recipients

	Sampling Frame[a] (N)	Sample (n)	Survey Sample[b] (n)	Contacted[c] (n)	Survey Responses[d] (n)	Response Rates[e] A (%)	Response Rates[e] B (%)
Total	438,078	51,711	49,671	45,994	32,877	66.2	71.5
Field of Doctorate/Employment[f]							
Mathematics/Computer Sci.	19,875	3,582	3,497	3,229	2,170	62.1	67.2
Physics/Astronomy	30,422	3,139	3,058	2,856	1,985	64.9	69.5
Chemistry	50,179	4,360	4,262	3,912	2,782	65.3	71.1
Environmental Sciences	11,050	2,096	2,025	1,898	1,429	70.6	75.3
Engineering	51,830	2,793	2,734	2,473	1,684	61.6	68.1
Life Sciences	89,515	15,064	14,564	13,588	9,858	67.7	72.5
Psychology	41,776	4,691	4,520	4,170	2,964	65.6	71.1
Social Sciences	55,819	4,896	4,654	4,323	2,984	64.1	69.0
Natural Sciences[g]	1,483	244	124	120	95	76.6	79.2
Physical Sciences[g]	227	221	221	192	104	47.1	54.2
Behavioral Sciences[g]	3,766	215	146	136	107	73.3	78.7
All S/E Fields[g]	2,568	349	253	235	174	68.8	74.0
History	19,627	1,141	1,088	1,023	763	70.1	74.6
Art History	1,893	666	643	603	470	73.1	77.9
Music	4,395	686	660	618	496	75.2	80.3
Speech	4,357	786	749	699	533	71.2	76.3
Philosophy	6,158	804	774	708	492	63.6	69.5
English/American Literature	21,782	1,227	1,158	1,084	786	67.9	72.5
Classical Lang./Literature	2,036	635	602	561	402	66.8	71.7
Modern Lang./Literature	12,268	2,156	2,080	1,892	1,393	67.0	73.6
Other Humanities	2,805	801	764	711	566	74.1	79.6
Languages[g]	453	194	190	170	103	54.2	60.6
Other Humanities[g]	959	494	480	434	308	64.2	71.0
All Humanities Fields[g]	1,804	358	354	306	200	56.5	65.4
Field Unknown	531	113	71	53	29	40.8	54.7
Year of Doctorate							
CY1936-CY1957	92,183	12,343	11,012	10,251	7,546	68.5	73.6
CY1958-FY1965	74,687	8,299	7,951	7,455	5,340	67.2	71.6
FY1966-FY1969	69,089	7,494	7,289	6,731	4,775	65.5	70.9
FY1970-FY1974	113,735	12,172	12,072	11,132	7,801	64.6	70.1
FY1975-FY1976	44,695	5,235	5,232	4,855	3,397	64.9	70.0
FY1977-FY1978	42,267	5,523	5,520	5,141	3,766	68.2	73.3
Merged Cohorts[h]	747	441	410	310	201	49.0	64.8
Cohort Unknown	675	204	185	119	51	27.6	42.9
Sex							
Male	378,074	33,752	32,400	30,137	21,457	66.2	71.2
Female	60,004	17,959	17,271	15,857	11,420	66.1	72.0
Racial/Ethnic Group							
White/Unknown	423,419	47,057	45,043	41,811	30,308	67.3	72.5
Minority Group[i]	14,659	4,654	4,628	4,183	2,569	55.5	61.4
Citizenship							
U.S.	298,561	32,634	32,065	30,204	22,350	69.7	74.0
Foreign	39,522	5,361	5,313	4,602	2,368	44.6	51.5
Unknown	99,995	13,716	12,293	11,188	8,159	66.4	72.9
Location of Ph.D. Institution							
U.S.	426,201	49,907	47,981	44,698	32,018	66.7	71.6
Foreign	11,877	1,804	1,690	1,296	859	50.8	66.3

Source: Survey of Doctorate Recipients.

Sampling error, or standard error, is a measure of the precision with which an estimate based on the survey sample approximates the average result of all possible samples of equal size conducted under the same conditions.

The size of the error is directly related to the size of the sample and the response rate.[5]

Because of the small number of minority Ph.D.s in the population, estimates of their characteristics are likely to have high standard errors. At 31.7 percent, the average sampling rate used in the Survey for the racial/ethnic variable was actually quite high. Even so, the data are often inadequate for reporting detailed estimates by individual field of degree and have frequently been merged into aggregated categories.

---

[5]Procedures used in calculating standard error for SDR publications are described in the 1979 Profile, Appendix E. A desired confidence interval can be constructed by multiplying the standard error by the appropriate coefficient: ±1 standard error will provide a 66.7 percent confidence interval, ±2 standard errors will provide approximately a 95 percent interval. (This means that in the long run the estimate will fall within the observed interval 95 out of 100 times.)

Notes for TABLE 1.1

[a]The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science and engineering. Hence, these numbers exceed the population estimates shown in the other tables of this report.

[b]The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1979 survey. The out-of-scope classification is assigned to an individual who indicated in a previous survey that he or she:

a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position, or

b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.

[c]The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

[d]Responses include individuals found to be deceased in the 1979 survey and persons residing in foreign countries in 1979.

[e]Response rate "A" is the number of 1979 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1979 survey responses divided by the number assumed to have been contacted.

[f]Individuals who earned doctorates in science, engineering, or the humanities were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

[g]Merged fields created for certain small subgroups when sample was reduced.

[h]Merged cohorts created for certain small subgroups when sample was reduced.

[i]Includes only those individuals whose ethnic group was known at the time the sample was selected.

In addition, the SDR sample did not include Ph.D.s in education or in the professional fields,[6] which represent a sizable proportion of all doctorate recipients. For example, the NRC's Doctorate Records File indicates that 25 percent of all Ph.D.s received by U.S. citizens during 1973-1978 were awarded in education. Nonetheless, the SDR sample can be considered representative of all minority group Ph.D.s. The one possible exception might be U.S.-born blacks, 60 percent of whose Ph.D.s during 1973-1978 were awarded in the field of education.

Given the present data sources, however, the report affords the most comprehensive compilation to date of information on the employment status of racial/ethnic minority Ph.D.s in science, engineering, and the humanities.

ORGANIZATION OF THE REPORT

Central to the report are extensive tables that bring together selected demographic and employment statistics for the total population of Ph.D.s in science, engineering, and the humanities. Accompanying discussions in the text highlight data of particular interest. Throughout the report, U.S.-born and foreign-born doctorate recipients are treated separately, reflecting their significantly different profiles.

Foreign-born whites, although not discussed in the text, are included in the tables, so as to provide the reader with more complete population estimates. The tables in the report use the five racial/ethnic categories that have been specified for federal reporting purposes:[7]

---

[6]That is, applied art, religion/theology, business administration, home economics, journalism, speech and hearing sciences, law, jurisprudence, and social work.

[7]OMB Directive No. 15. (May 12, 1977) Race and Ethnic Standard for Federal Statistics and Administrative Reporting.

White (not of Hispanic origin): All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.

Black (not of Hispanic origin): All persons having origins in any of the black racial groups.

Hispanic: All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture origins, regardless of race.

Asian or Pacific Islanders: All persons having origins in any of the original peoples of the Far East, Southeast Asia, or the Pacific Islands. This area includes, for example, China, Japan, Korea, the Philippine Islands, Samoa, and the Indian subcontinent.

American Indian or Alaskan Native: All persons having origins in any of the original peoples of North America.

In addition to those tables giving the general demographic and employment data, there are tables and discussion in Chapter 3 that describe in detail the pattern of academic employment among these five racial/ethnic groups, including such variables as academic rank and tenure.

Another chapter presents specific data describing the pattern of nonacademic employment of Ph.D.s in all the racial/ethnic groups. These data cover the year and the field in which the Ph.D. was granted as well as the type of employer.

Finally, data are presented that describe the pattern of remuneration of science, engineering, and humanities Ph.D.s by racial/ethnic group, in both academic and nonacademic employment.

Throughout, where relevant and where possible, data showing a comparison of the employment status of male and female Ph.D.s are also included.

2
Demographic Characteristics

An estimated 395,500 individuals earned doctorates in science, engineering, and the humanities during the 42 years between 1936 and 1978 and were residing in the United States in February 1979. Of that number, 324,300 were in the science and engineering fields, of whom 308,800 were in the labor force.[8] The humanities Ph.D. population numbered 71,200, with 64,800 in the labor force.

The number of Ph.D. degrees awarded has increased dramatically over the past 20 years. In fact, more than three-fourths of the 395,500 science, engineering, and humanities Ph.D.s residing in the United States in 1979 received their doctorates after 1960 (Table 2.1). Even more rapid growth occurred in the number of U.S.-born minority Ph.D.s in these fields, approximately 85 percent of whom earned their degrees after 1960. Figure A illustrates the contrast in growth over the years of U.S.-born and foreign-born minority Ph.D.s.

When figures for the population of scientists and engineers are separated out, the number of doctorates granted to U.S.-born Asians, American Indians, and whites shows a steady increase in each succeeding decade. In contrast, approximately 66 percent of the U.S.-born black Ph.D.s in science and engineering earned their degrees

[8]The labor force is defined in this report as those individuals who were employed either full-time or part-time, on postdoctoral appointments, or unemployed and seeking work. Retired individuals or individuals who had voluntarily removed themselves from the job market were not included in the labor force estimates.

TABLE 2.1 Science, Engineering, and Humanities Ph.D.s in the United States, with Percentages, by Year of Ph.D. and Racial/Ethnic Category

Year of Ph.D.	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering	324,335	252,775	29,456	7,070	1,610	2,822	1,812	826	21,182	905	678	19,576
Percentages of:												
1936-49 Ph.D.s	7.4	7.4	9.4	4.0	1.1	6.2	2.9	4.2	0.7	3.2	0.0	0.6
1950-59 Ph.D.s	15.2	14.9	21.9	10.5	7.7	11.3	13.7	5.9	6.1	6.0	5.2	6.2
1960-69 Ph.D.s	30.3	29.9	34.8	26.1	24.6	16.9	37.9	34.9	28.0	14.3	11.1	29.3
1970-78 Ph.D.s	47.2	47.7	34.0	59.4	66.6	65.6	45.5	55.0	65.2	76.6	83.8	63.9
Humanities	71,174	54,185	5,676	2,233	941	875	147	270	1,395	694	114	575
Percentages of:												
1936-49 Ph.D.s	7.1	6.4	7.9	2.5	0.0	6.1	0.0	0.7	0.0	0.0	0.0	0.0
1950-59 Ph.D.s	13.2	11.9	9.6	12.9	10.9	13.6	12.9	17.0	7.5	8.1	0.0	8.3
1960-69 Ph.D.s	27.5	26.5	31.3	22.2	22.7	20.1	34.7	20.4	20.8	20.5	2.6	25.2
1970-78 Ph.D.s	52.2	55.1	51.2	62.5	66.3	60.2	52.4	61.9	71.8	71.5	97.4	66.4

Source: 1979 Survey of Doctorate Recipients.

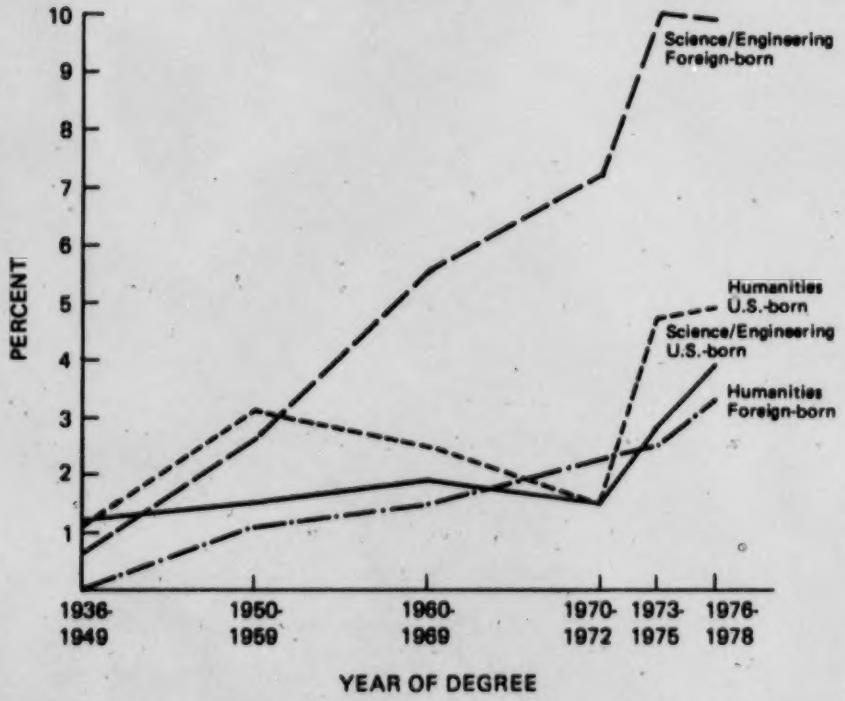
during the 1970s, compared with 17 percent in the 1960s. And, in the case of U.S.-born Hispanics and foreign-born minorities, 90 percent earned their doctorates between 1960 and 1978.

In the humanities population, the increase in number of degrees earned during the 1970s was even greater than that in science and engineering. Twenty-two percent of the U.S.-born minorities with humanities doctorates earned their degrees in the 1960s, whereas 63 percent earned their Ph.D.s degrees in the 1970s. Foreign-born minority humanists followed the same pattern of growth: 21 percent of their Ph.D.s were earned in the 1960s and 72 percent in the 1970s. Less dramatic growth was shown for U.S.-born whites: 27 percent of the humanities Ph.D. recipients earned their degrees in the 1960s and 55 percent in the 1970s (Table 2.1).

It would be misleading, however, to characterize the 1970s solely as a decade of unalloyed acceleration in the number of Ph.D.s granted by U.S. institutions. While the period does show substantial overall increases, its later years witnessed the beginning of a decline.

A smaller percentage of the total science and engineering doctoral population earned their Ph.D.s during 1973-1975 than during 1970-1972. The decline began after 1975 in the humanities, for which the 1973-1975 cohort was the last to show growth. The SDR data show, however, that for the science, engineering, and humanities fields this decrease in Ph.D. production occurred almost exclusively in the white male category, while the number of women and U.S.-born minorities to earn Ph.D.s continued to increase throughout the 1970s.

Science and engineering doctorates outnumbered humanities doctorates by about 4 to 1. Foreign-born minorities with science or engineering degrees outnumbered those with humanities degrees by approximately 15 to 1. Among U.S.-born minorities, the ratio was 3 to 1.



SOURCE: 1979 Survey of Doctorate Recipients

FIGURE A Racial/Ethnic Minority Ph.D.s by Year of Degree, as a Percentage of the Total Population in the Cohort.

SEX DISTRIBUTION

While the ratio between the numbers of science and engineering degrees and humanities degrees has been fairly stable, the ratio of men to women in all three broad fields has been undergoing some major changes over the years (Table 2.2). From 1960 on, the percentage of female Ph.D.s, and in particular U.S.-born minority female Ph.D.s, has increased more rapidly than that of the total science, engineering, and humanities Ph.D. population.

TABLE 2.2 Science, Engineering, and Humanities Ph.D.s in the United States, with Percentages, by Sex, Year of Ph.D., and Racial/Ethnic Category

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Sex/Yr. of Ph.D.	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
1936-78 Ph.D.s												
Sci/Engin. Total	324,335	252,775	29,456	7,070	1,610	2,822	1,812	826	21,182	905	678	19,576
% Men	88.8	88.9	89.1	82.4	88.6	74.2	87.5	87.0	8.97	82.1	91.3	89.9
% Women	11.2	11.1	10.9	17.6	11.4	25.8	12.5	13.0	10.3	17.9	8.7	10.1
Humanities Total	71,174	54,185	5,676	2,233	941	875	147	270	1,395	694	114	575
% Men	74.4	74.9	66.2	71.0	69.0	72.0	45.6	88.5	70.0	68.2	78.9	71.8
% Women	25.6	25.1	33.8	29.0	31.0	28.0	54.4	11.5	30.0	31.8	21.1	28.2
1960-69 Ph.D.s												
Sci/Engin. Total	98,118	75,575	10,252	1,847	396	477	686	288	5,941	129	75	5,737
% Men	91.8	92.0	91.8	89.6	91.4	78.0	94.6	94.4	91.0	85.3	85.3	91.2
% Women	8.2	8.0	8.2	10.4	8.6	22.0	5.4	5.6	9.0	14.7	14.7	8.8
Humanities Total	19,608	14,373	1,776	496	214	176	51	55	290	142	*	145
% Men	80.4	81.4	74.9	73.6	65.0	75.0	88.2	89.1	80.7	84.5	*	78.6
% Women	19.6	18.6	25.1	26.4	35.0	25.0	11.8	10.9	19.3	15.5	*	21.4
1970-78 Ph.D.s												
Sci/Engin. Total	152,934	120,644	10,005	4,202	1,072	1,852	824	454	13,801	693	568	12,517
% Men	85.0	85.0	83.2	77.4	87.7	70.4	77.5	81.7	89.1	81.7	91.5	89.4
% Women	15.0	15.0	16.8	22.6	12.3	29.6	22.5	18.3	10.9	18.3	8.5	10.6
Humanities Total	37,139	29,864	2,908	1,395	624	527	77	167	1,001	496	111	382
% Men	68.0	68.7	56.0	67.3	65.5	69.1	28.6	86.2	65.3	61.9	81.1	67.3
% Women	32.0	31.3	44.0	32.7	34.5	30.9	71.4	13.8	34.7	38.1	18.9	32.7

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

Women earned approximately 15 percent of the science and engineering Ph.D. degrees awarded during 1970-1978, which was almost double the proportion of degrees they had earned during 1960-1969. About 23 percent of the science and engineering degrees granted to U.S.-born minorities in 1970-1978 went to women, compared with 10 percent during 1960-1969. Among the various racial/ethnic groups,

the highest ratio of women to men occurred among U.S.-born black women, who earned 22 percent of the 1960-1969 Ph.D.s awarded to U.S.-born blacks and 30 percent of the 1970-1978 Ph.D.s awarded.

The number of women in the humanities fields, and in particular U.S.-born minority women, increased at about the same rate as that of women in science and engineering. Women received less than 20 percent of the humanities degrees granted during 1960-1969, and 32 percent of those granted during 1970-1978. Following a similar pattern, women earned about 26 percent of the humanities degrees granted to U.S.-born minorities during 1960-1969, and approximately 33 percent of those granted during 1970-1978. Among the various racial/ethnic groups, the population of U.S.-born Hispanics who earned Ph.D.s in 1960-1969 contained the highest percentage of females (35 percent) for this period. This proportion remained high in 1970-1978, but was overshadowed by the dramatic change in the percentage of women humanists within the U.S.-born Asian group: from 12 percent in 1960-1969 to 71 percent in 1970-1978.

PH.D. FIELD DISTRIBUTION

As shown in the cohorts for 1936-1969 and 1970-1978, Ph.D. field distribution has remained fairly stable over the years within most science and engineering fields (Table 2.3A), and even more so within the humanities fields (Table 2.3B). One exception occurred in the behavioral sciences, where the proportion of both the U.S.-born whites and U.S.-born minorities who obtained degrees in these fields was higher in 1970-1978 than in 1936-1969 (Table 2.3A). During the earlier cohort years, behavioral sciences accounted for 24 percent of the degrees awarded to U.S.-born whites and over 35 percent of those awarded to U.S.-born minorities, and in the 1970-1978 cohort, the percentages had increased to 35 and 41 percent, respectively. The corresponding declines occurred in the engineering, mathematics, and physical sciences for U.S.-born whites, a drop from 51 percent in 1936-1969 to 42 percent in 1970-1978, and in the life sciences for U.S.-born minorities, from 33 to 26 percent in the same periods.

TABLE 2.3A Science and Engineering Ph.D.s in the United States, with Percentages, by Year of Ph.D., Ph.D. Field, and Racial/Ethnic Category

Field/Year of Ph.D.	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S. Born					Foreign Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
1936-69 Ph.D.s	171,401	132,131	19,451	2,868	538	970	988	372	7,381	212	110	7,059
Percentages of:												
EMP*	51.0	50.0	59.6	31.2	23.4	30.5	37.6	27.7	63.3	50.9	3.6	64.6
Life Sciences	25.8	26.2	21.6	33.3	31.2	32.5	34.4	35.2	24.9	20.3	13.6	25.3
Behavioral Sciences	23.2	23.8	18.8	35.5	45.4	37.0	28.0	37.1	11.7	28.8	82.7	10.1
1970-78 Ph.D.s	152,934	120,644	10,005	4,202	1,072	1,852	824	454	13,801	693	568	12,517
Percentages of:												
EMP*	42.3	39.2	48.0	32.6	40.1	26.7	33.7	36.6	66.8	41.7	25.4	70.0
Life Sciences	25.2	26.0	21.7	26.0	26.8	24.3	32.6	19.2	21.9	39.1	28.2	20.7
Behavioral Sciences	32.5	34.8	30.3	41.4	33.1	49.0	33.6	44.3	11.3	19.2	46.5	9.3

*Engineering, Mathematics, Physical Sciences.

Source: 1979 Survey of Doctorate Recipients.

TABLE 2.3B Humanities Ph.D.s in the United States, with Percentages, by Year of Ph.D., Ph.D. Field, and Racial/Ethnic Category

Field/Year of Ph.D.	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S. Born					Foreign Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
1936-69 Ph.D.s	34,035	24,321	2,768	838	317	348	70	103	394	198	*	193
Percentages of:												
History	27.1	28.5	18.9	22.0	22.4	30.2	10.0	1.0	17.3	0.0	*	35.2
English Lang&Lit	27.7	31.0	14.1	18.0	26.8	15.5	14.3	1.9	2.8	0.0	*	4.1
Other Languages	20.1	15.2	49.1	30.2	45.1	15.5	37.1	29.1	55.6	94.4	*	16.6
Other Humanities	25.1	25.2	17.9	29.8	5.7	38.8	38.6	68.0	24.4	5.6	*	44.0
1970-78 Ph.D.s	37,139	29,864	2,908	1,395	624	527	77	167	1,001	496	111	382
Percentages of:												
History	24.5	25.9	14.4	22.3	18.3	26.8	7.8	29.9	10.1	4.4	46.8	7.1
English Lang&Lit	28.3	30.5	13.3	24.1	30.3	21.8	27.3	6.6	8.4	1.0	14.4	13.6
Other Languages	21.0	16.7	52.3	27.6	43.1	13.3	24.7	16.2	54.2	80.4	13.5	33.5
Other Humanities	26.2	26.9	20.0	26.0	8.3	38.1	40.3	47.3	27.3	14.1	25.2	45.8

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

As Table 2.4A shows, the behavioral (psychology and social sciences) and biological sciences accounted for approximately 60 percent of the total science and engineering Ph.D. degrees earned by U.S.-born minorities by 1979 and only 48 percent of those held by U.S.-born whites. Blacks, both U.S.-born and foreign-born, had the largest percentages, with 65 percent of each group holding degrees in the biological and behavioral sciences. Among U.S.-born minorities, Hispanics had the smallest proportion (55 percent) of Ph.D.s earned in these fields. By contrast, only 20 percent of the foreign-born Asians had earned Ph.D.s in the behavioral and biological sciences (10 percent in each).

The 27 percent of U.S.-born Asians holding degrees in the biological sciences was larger than that of any other racial/ethnic group, including the whites (about 19 percent). U.S.-born blacks held only 4 percent of their total doctorates in the field of engineering, the lowest of all racial/ethnic groups. Minorities, both U.S. and foreign-born, held a higher percentage of their total degrees in medical sciences than did the U.S.-born whites.

Foreign-born minority Ph.D.s in science and engineering fields, of whom more than 90 percent are Asian, were concentrated in the fields of chemistry, the biological sciences, and engineering. In fact, the percentage of foreign-born minorities with degrees in engineering was more than double that of U.S.-born whites, and more than five times that of U.S.-born minority doctorate recipients.

There was interesting variation as well among the U.S.-born minority groups with respect to field preference in the humanities (Table 2.4B). U.S.-born Hispanics, for example, more frequently earned degrees in modern languages and literature (43 percent) and English (29 percent) than other minority groups. U.S.-born blacks had the highest percentage of Ph.D.s in the field of history (28 percent).

TABLE 2.4A Science and Engineering Ph.D.s in the United States, with Percentages, by Ph.D. Field and Racial/Ethnic Category

Field of Ph.D.		Grand Total	White		Minorities								
			U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
					Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
All Fields	N	324,335	252,775	29,456	7,070	1,610	2,822	1,812	826	21,182	905	678	19,576
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mathematics	N	17,030	12,930	1,699	305	91	153	30	31	1,090	53	21	993
	%	5.3	5.1	5.8	4.3	5.7	5.4	1.7	3.8	5.1	5.9	3.1	5.1
Computer Sciences	N	1,824	1,390	157	23	3	0	4	16	183	17	0	166
	%	0.6	0.5	0.5	0.3	0.2	0.0	0.2	1.9	0.9	1.9	0.0	0.8
Physics/Astronomy	N	27,655	20,595	3,436	485	126	194	87	78	1,561	16	0	1,545
	%	8.5	8.1	11.7	6.9	7.8	6.9	4.8	9.4	7.4	1.8	0.0	7.9
Chemistry	N	46,593	35,922	5,064	873	149	314	322	88	3,169	173	71	2,925
	%	14.4	14.2	17.2	12.3	9.3	11.1	17.8	10.7	15.0	19.1	10.5	14.9
Environmental Scis	N	10,400	8,574	1,047	113	37	14	35	27	356	13	6	337
	%	3.2	3.4	3.6	1.6	2.3	0.5	1.9	3.3	1.7	1.4	0.9	1.7
Engineering	N	48,605	33,906	5,001	466	150	116	171	29	7,531	125	50	7,356
	%	15.0	13.4	17.0	6.6	9.3	4.1	9.4	3.5	35.6	13.8	7.4	37.6
Agricultural Scis	N	14,757	11,957	907	256	70	62	65	59	1,029	74	59	896
	%	4.5	4.7	3.1	3.6	4.3	2.2	3.6	7.1	4.9	8.2	8.7	4.6
Medical Sciences	N	9,050	6,773	869	298	99	127	54	18	715	28	30	657
	%	2.8	2.7	3.0	4.2	6.1	4.5	3.0	2.2	3.4	3.1	4.4	3.4
Biological Sciences	N	58,875	47,283	4,589	1,493	286	576	490	141	3,123	212	86	2,825
	%	18.2	18.7	15.6	21.1	17.8	20.4	27.0	17.1	14.7	23.4	12.7	14.4
Psychology	N	39,691	33,919	2,225	1,259	266	588	271	134	309	113	18	178
	%	12.2	13.4	7.6	17.8	16.5	20.8	15.0	16.2	1.5	12.5	2.7	0.9
Social Sciences	N	49,855	39,526	4,462	1,499	333	678	283	205	2,116	81	337	1,698
	%	15.4	15.6	15.1	21.2	20.7	24.0	15.6	24.8	10.0	9.0	49.7	8.7

Source: 1979 Survey of Doctorate Recipients.

TABLE 2.4B Humanities Ph.D.s in the United States, with Percentages, by Ph.D. Field and Racial/Ethnic Category

Field of Ph.D.		Grand Total	White		Minorities								
			U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
					Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
All Fields	N	71,174	54,185	5,676	2,233	941	875	147	270	1,395	694	114	575
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
History	N	18,309	14,686	942	495	185	246	13	51	169	22	52	95
	%	25.7	27.1	16.6	22.2	19.7	28.1	8.8	18.9	12.1	3.2	45.6	16.5
Art History	N	1,744	1,369	147	22	1	5	6	10	31	10	0	21
	%	2.5	2.5	2.6	1.0	0.1	0.6	4.1	3.7	2.2	1.4	0.0	3.7
Music	N	4,411	3,704	133	195	16	121	18	40	44	9	6	29
	%	6.2	6.8	2.3	8.7	1.7	13.8	12.2	14.8	3.2	1.3	5.3	5.0
Speech/Theater	N	4,081	3,198	121	133	2	89	4	38	11	0	1	10
	%	5.7	5.9	2.1	6.0	0.2	10.2	2.7	14.1	0.8	0.0	0.9	1.7
Philosophy	N	5,784	4,398	381	129	8	43	27	51	164	39	21	104
	%	8.1	8.1	6.7	5.8	0.9	4.9	18.4	18.9	11.8	5.6	18.4	18.1
Other Humanities	N	2,286	1,485	295	134	43	78	3	10	119	23	0	96
	%	3.2	2.7	5.2	6.0	4.6	8.9	2.0	3.7	8.5	3.3	0.0	16.7
Engl/Amer. Lang&Lit	N	19,903	16,654	777	487	274	169	31	13	95	5	19	60
	%	28.0	30.7	13.7	21.8	29.1	19.3	21.1	4.8	6.8	0.7	16.7	10.4
Classical Lang&Lit	N	1,800	1,303	209	46	8	17	11	10	7	0	0	7
	%	2.5	2.4	3.7	2.1	0.9	1.9	7.5	3.7	0.5	0.0	0.0	1.2
Modern Lang&Lit	N	12,856	7,388	2,671	592	404	107	34	47	755	586	15	153
	%	18.1	13.6	47.1	26.5	42.9	12.2	23.1	17.4	54.1	84.4	13.2	26.6

Source: 1979 Survey of Doctorate Recipients.

EMPLOYMENT STATUS

The overall percentage of science and engineering Ph.D.s employed full-time in the 1979 U.S. labor force (92 percent) was slightly higher than that of humanities Ph.D.s (90 percent). Three percent of the science and engineering Ph.D.s were employed part-time, and 8 percent of those in the humanities were so employed (Table 2.5).

TABLE 2.5 Employment Status of Science, Engineering, and Humanities Ph.D.s in the U.S. Labor Force*

Employment Status	Total	U.S.-Born Whites	U.S.-Born Minorities				Foreign-Born Minorities
			Total†	Hisp	Black	Asian	
Science/Engineering							
Total Labor Force	308,819	240,586	6,792	1,585	2,683	1,725	20,786
Percentages of:							
Full-Time Employed	92.4	92.6	89.6	87.5	88.7	90.3	92.5
Part-Time Employed	3.3	3.4	3.3	2.3	5.7	1.4	1.4
Postdoctoral Appt.	3.3	3.2	4.9	8.5	2.0	7.4	5.0
Unemployed, Seeking	1.0	0.8	2.2	1.7	3.6	0.9	1.1
Humanities							
Total Labor Force	64,776	49,476	2,137	939	802	132	1,330
Percentages of:							
Full-Time Employed	89.6	89.8	92.4	93.0	95.7	90.9	84.7
Part-Time Employed	7.5	7.3	6.0	5.0	3.4	5.3	10.3
Postdoctoral Appt.	0.7	0.7	0.3	0.5	0.0	0.0	2.3
Unemployed, Seeking	2.2	2.2	1.3	1.5	0.9	3.8	2.7

*The labor force is the sum of full- and part-time employed, the unemployed who are seeking work, and Ph.D.s on postdoctoral appointments.
†Includes American Indians.

Source: 1979 Survey of Doctorate Recipients.

This table also indicates that the employment situation for minorities was similar to that of the Ph.D. labor force as a whole, although part-time employment was about twice as high in the humanities fields as it was in the science and engineering fields for all minority groups except U.S.-born blacks. U.S.-born black scientists and engineers were more likely than any others to be employed part-time, whereas U.S.-born black humanists were less likely than all other humanists to be employed part-time.

Table 2.5 also indicates unemployment rates among Ph.D.s in science, engineering, and the humanities. Overall, the rate for doctoral scientists and engineers in February 1979 was 0.9 percent. The unemployment rate (2.2 percent) for U.S.-born minority Ph.D.s in science and engineering, however, was more than twice as high as that for U.S.-born whites (0.8 percent), and the rate for U.S.-born blacks was more than three times as high as the rate for whites (3.6 percent, compared with 0.8 percent).

Among Ph.D.s in the humanities, the difference between the unemployment rates for U.S.-born minorities (1.3 percent) and U.S.-born whites (2.2 percent) was not statistically significant, nor were those among the various U.S.-born minority groups.

Men made up 89 percent of the science and engineering population and 74 percent of the humanities population (Table 2.2). While sex differences are not a specific issue in this report, data on minority and white women are presented when the data on minority women are adequate. Table 2.6 provides information on the unemployment and withdrawal rates of science, engineering, and humanities Ph.D.s by sex.

TABLE 2.6 Withdrawal* and Unemployment Rates for Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category

	Science/Engineering			Humanities		
	U.S.-Born Whites	U.S.-Born Minorities	Foreign-Born Minorities	U.S.-Born Whites	U.S.-Born Minorities	Foreign-Born Minorities
Men, Total Population	224,614	5,826	18,991	40,605	1,585	976
Withdrawal Rates	0.6	0.9	0.7	1.2	0.4	4.1
Women, Total Population	28,161	1,244	2,191	13,580	648	419
Withdrawal Rates	5.1	2.7	4.3	5.6	1.1	2.6
Men, Labor Force	215,174	5,608	18,735	37,445	1,535	930
Unemployment Rate	0.6	2.1	0.8	1.4	1.1	1.3
Women, Labor Force	25,422	1,184	2,051	12,031	602	400
Unemployment Rate	2.7	2.7	3.8	4.8	1.8	6.0

*Percent withdrawn is the percentage of the population who are unemployed and no longer seeking employment, whereas, the unemployment rate is the percentage of the labor force unemployed and seeking employment.

Source: 1979 Survey of Doctorate Recipients.

The data show that U.S.-born white female Ph.D.s are much more frequently unemployed or withdrawn from the labor force than are white men. The data suggest that, with respect to unemployment rates, there is little difference between U.S.-born minority men and women. However, in science and engineering, and the humanities as well, U.S.-born minority women are less likely than U.S.-born white women to be withdrawn from the labor force. Among male science and engineering Ph.D.s, U.S.-born minorities are more likely to be unemployed than are U.S.-born whites.

3
Academic Employment

In February 1979, institutions of higher education were the principal employers of 54 percent of the Ph.D.s with science or engineering degrees and 84 percent of the humanities doctorate recipients. This chapter will provide an examination of the pattern of academic employment of Ph.D.s, with special focus on comparisons between minorities and whites. The population includes those Ph.D.s who were employed full or part-time (excluding postdoctoral appointments) in U.S. institutions of higher education (including two-year colleges).

U.S.-born minority Ph.D.s with science or engineering degrees were more frequently employed in the academic sector (60 percent) than were the U.S.-born white Ph.D.s (54 percent), although the difference was small (Table 3.1). For humanists, however, the percentages of academically employed were even closer for U.S.-born minorities and whites (82 and 84 percent, respectively).

Foreign-born minorities with science or engineering degrees had a lower rate (44 percent) of academic employment than foreign-born minorities with humanities doctorates (91 percent). Foreign-born blacks in science and engineering differed from other foreign-born minority science and engineering Ph.D.s in that 70 percent of them were employed in higher education.

TABLE 3.1 Percentage of Academically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category

	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total Employed	295,731	231,029	27,044	6,313	1,423	2,531	1,581	778	19,516	848	638	18,007
% in Academe	53.6	53.8	56.9	60.3	61.8	58.6	59.0	65.7	43.5	39.5	70.1	42.7
Men Employed	265,942	207,901	24,455	5,238	1,264	1,889	1,406	679	17,787	717	579	16,468
% in Academe	52.7	52.9	56.0	59.2	60.0	58.1	57.1	65.1	42.2	37.1	70.5	41.3
Women Employed	29,789	23,128	2,589	1,075	159	642	175	99	1,729	131	59	1,539
% in Academe	61.8	62.0	64.9	65.7	76.1	60.3	73.7	69.7	57.0	52.7	66.1	57.0
Humanities												
Total Employed	62,896	48,068	4,882	2,103	920	795	127	261	1,263	632	97	522
% in Academe	84.0	83.7	86.9	81.6	82.2	84.8	81.9	69.3	91.3	93.5	95.9	87.7
Men Employed	47,800	36,756	3,299	1,518	637	579	67	235	896	441	76	379
% in Academe	84.4	84.0	87.8	82.2	86.2	85.3	73.1	66.4	92.5	95.5	94.7	88.7
Women Employed	15,096	11,312	1,583	585	283	216	60	26	367	191	21	143
% in Academe	82.8	82.7	85.0	79.8	73.1	83.3	91.7	96.2	88.3	89.0	100.0	85.3

Source: 1979 Survey of Doctorate Recipients.

TABLE 3.2 Percentage of Academically Employed 1960-1978 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category

	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Employed 1960-69 Ph.D.s	95,264	73,396	10,026	1,733	391	412	656	274	5,866	129	75	5,662
% in Academe	57.8	57.5	59.4	67.6	67.5	60.7	64.3	85.8	53.8	69.0	90.7	52.9
Employed 1970-78 Ph.D.s	138,831	110,168	8,760	3,679	897	1,706	641	435	12,370	638	556	11,153
% in Academe	50.5	51.4	55.0	58.0	63.1	57.9	50.9	58.9	36.6	37.1	66.9	35.0
Humanities												
Employed 1960-69 Ph.D.s	18,425	13,493	1,606	491	214	171	51	55	290	142	*	145
% in Academe	90.7	91.4	93.9	88.8	95.8	94.7	64.7	65.5	93.4	100.0	*	86.9
Employed 1970-78 Ph.D.s	34,288	27,649	2,556	1,334	603	506	67	158	869	434	94	329
% in Academe	80.2	79.4	80.2	79.2	75.8	84.0	92.5	70.9	91.6	91.2	95.7	90.9

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

ACADEMIC EMPLOYMENT BY SEX

The SDR data in Table 3.1 also show that women in all racial/ethnic groups with doctoral degrees in science or engineering, except for foreign-born blacks, were more frequently employed in academe than were their male counterparts. Among humanities Ph.D.s, only U.S.-born Asians, American Indians, and foreign-born blacks had significantly higher percentages of academically employed women than men.

YEAR OF PH.D.

An examination of the data for the 1960s and 1970s suggest that both minorities and whites may be moving away from academic employment (Table 3.2). A smaller percentage of Ph.D.s who received their degrees during the 1970s were employed in the academic sector than of those who graduated in the 1960s. In science and engineering fields, the difference between 1960s and 1970s graduates in academic employment was largest for the foreign-born Asians, who dropped from 53 percent of the 1960s Ph.D.s to 35 percent of the 1970s Ph.D.s. Of the U.S.-born minorities, 68 percent of the 1960s graduates were academically employed, compared with 58 percent of the 1970s graduates. The difference between 1960s and 1970s Ph.D. graduates was smallest for the U.S.-born whites: 58 percent of the 1960s doctorate recipients were academically employed, compared with 51 percent of the 1970s graduates.

In the humanities fields, 91 percent of the U.S.-born whites and 89 percent of the U.S.-born minorities who had received their degrees in the 1960s were employed in the academic sector. Comparative figures for academically employed 1970s graduates were 79 percent of the U.S.-born whites and 79 percent of the U.S.-born minorities. On the other hand, foreign-born minorities who graduated in the 1960s and the 1970s were employed almost exclusively in higher education (93 percent of the 1960s graduates and 92 percent of the 1970s graduates).

FIELD OF DEGREE

Table 3.3 shows that over half of both U.S.-born whites (55 percent) and U.S.-born minorities (62 percent) who had Ph.D.s in science and engineering and were academically employed had earned their degrees in the behavioral (psychology and the social sciences) and biological sciences. A smaller proportion of foreign-born minorities (42 percent) earned degrees in these fields. Indeed, only one percent of the academically employed foreign-born Asians, who constitute approximately 90 percent of the foreign-born minority scientists and engineers, had psychology degrees, while 16 percent of the U.S.-born minorities and 12 percent of the U.S.-born whites had psychology degrees.

Foreign-born Ph.D.s, with the exception of foreign-born blacks, who held 55 percent of their degrees in the behavioral sciences, were more highly concentrated in the EMP fields (engineering, mathematics, and the physical sciences) than were either U.S.-born minorities or whites. Almost 50 percent of the large number of foreign-born Asian Ph.D.s were in the EMP fields, 19 percent were in engineering alone. Only 10 percent of the U.S.-born whites and 5 percent of the U.S.-born minorities had engineering doctorates.

While the academically employed foreign-born minorities with Ph.D.s in science and engineering fields were 90 percent Asian, only 40 percent of the academically employed foreign-born minority humanists were Asian, 51 percent being Hispanic, and 8 percent black.

Of all the academically employed humanists (Table 3.3), the majority earned their doctoral degrees in history, English/American languages and literature, and modern languages and literature: 71 percent of the U.S.-born whites, 73 percent of the U.S.-born minorities, and 74 percent of the foreign-born minorities. The U.S.-born minority and white populations were evenly distributed among these three fields, but over half (53 percent) of the foreign-born minority Ph.D.s in the humanities received their degrees in modern languages and literature.

TABLE 3.3 Academically Employed Science, Engineering, and Humanities Ph.D.s with Percentages by Field of Ph.D. and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Academically Employed	158,578	124,289	15,375	3,807	880	1,484	932	511	8,488	335	447	7,683
Percentages in:												
EMP Fields	38.9	37.0	49.3	28.4	30.7	27.6	27.9	28.2	47.6	46.6	13.6	49.5
Life Sciences	28.4	29.1	23.0	31.0	33.6	27.8	35.6	27.4	31.6	26.0	31.5	31.9
Behavioral Sciences	32.7	33.9	27.7	40.5	35.7	44.6	36.5	44.4	20.8	27.5	54.8	18.6
Humanities												
Academically Employed	52,853	40,247	4,243	1,715	756	674	104	181	1,153	591	93	458
Percentages in:												
History	24.1	25.2	18.3	22.0	20.6	28.2	12.5	9.9	13.0	3.7	40.9	19.7
English	29.1	32.4	9.6	21.8	27.5	20.6	15.4	6.1	7.5	0.8	18.3	11.8
Languages Total	20.2	15.4	51.6	29.9	45.5	14.5	18.3	28.2	53.8	83.8	10.8	25.1
Other Humanities	26.5	27.0	20.6	26.4	6.3	36.6	53.8	55.8	25.7	11.7	30.1	43.4

Source: 1979 Survey of Doctorate Recipients.

RACIAL/ETHNIC CATEGORY

Tables 3.4A and 3.4B indicate the percentages of academically employed Ph.D.s by field and racial/ethnic category relative to total numbers of employed Ph.D.s. Again, foreign-born Asians differed from U.S.-born minority and white Ph.D.s in the extent to which Ph.D.s in various fields were academically employed. In engineering, for example, only one out of five (21 percent) of the foreign-born Asians were employed in the academic sector, while over a third (37 percent) of the U.S.-born white engineering Ph.D.s and nearly a half (45 percent) of the U.S.-born minority engineering Ph.D.s were academically employed. In chemistry about 25 percent of the foreign-born Asians were employed in the academic sector, compared with 34 percent of the U.S.-born whites and 52 percent of the U.S.-born minorities.

U.S.-born minorities and whites with Ph.D.s in the social sciences, however, were less frequently employed in the academic sector than were foreign-born Asians. Less than three-fourths of the U.S.-born minorities (70 percent) and whites (74 percent) in the social sciences were academically employed, compared with 83 percent of the foreign-born Asians.

Table 3.4B shows that in most humanities fields there was little difference in the percentages of minorities and whites in academic employment, while a slightly higher percentage of foreign-born minority Ph.D.s were academically employed than were U.S.-born minority Ph.D.s. Only in history was the difference noteworthy: 77 percent of the U.S.-born white historians and 81 percent of the U.S.-born minority historians were academically employed, while 100 percent of the foreign-born minority historians were employed in the academic sector.

TABLE 3.4A Percentage of Academically Employed Science and Engineering Ph.D.s by Field of Ph.D. and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Total Sci/Engin Employed	295,731	231,029	27,044	6,313	1,423	2,531	1,581	778	19,516	848	638	18,007
% in Academe	53.6	53.8	56.9	60.3	61.8	58.6	59.0	65.7	43.5	39.5	70.1	42.7
EMP Employed	142,110	105,991	15,510	1,992	445	704	579	264	13,035	387	148	12,477
% in Academe	43.4	43.4	48.9	54.4	60.7	58.1	44.9	54.5	31.0	40.3	41.2	30.5
Mathematics Employed	16,035	12,137	1,620	296	89	153	23	31	1,082	53	*	985
% in Academe	76.6	75.4	80.5	80.7	95.5	80.4	82.6	38.7	76.8	88.7	*	75.1
Computer Sci Employed	1,783	1,375	144	23	*	*	*	16	170	17	*	153
% in Academe	45.3	51.3	11.8	87.0	*	*	*	81.3	28.2	11.8	*	30.1
Physics/Astronomy Employed	25,611	19,145	3,223	402	85	156	85	76	1,439	16	*	1,423
% in Academe	50.6	48.4	56.6	50.5	71.8	42.9	54.1	38.2	57.3	31.3	*	57.6
Chemistry Employed	41,970	32,356	4,784	761	138	266	272	85	2,773	168	71	2,534
% in Academe	34.1	33.6	37.4	52.2	37.7	51.5	50.4	83.5	26.0	28.0	47.9	25.3
Environmental Sci Employed	9,729	8,073	943	100	36	13	24	27	338	8	*	324
% in Academe	46.9	46.5	56.1	38.0	58.3	7.7	20.8	40.7	34.9	75.0	*	32.7
Engineering Employed	46,982	32,905	4,796	410	94	116	171	29	7,233	125	*	7,058
% in Academe	35.6	37.2	44.2	45.4	51.1	69.8	28.7	27.6	20.7	39.2	*	20.5
Life Sci Employed	70,929	56,859	5,503	1,777	400	682	500	195	4,184	269	163	3,752
% in Academe	63.6	63.5	64.3	66.5	74.0	60.6	66.4	71.8	64.1	32.3	86.5	65.4
Agricultural Sci Employed	13,430	11,046	795	244	67	53	65	59	914	74	59	781
% in Academe	57.3	57.3	50.4	78.3	68.7	90.6	95.4	59.3	56.9	58.1	79.7	55.1
Medical Sci Employed	7,949	5,929	754	278	94	120	46	18	647	28	18	601
% in Academe	56.5	56.8	55.4	57.9	55.3	57.5	63.0	61.1	55.5	42.9	100.0	54.7
Biological Sci Employed	49,550	39,884	3,954	1,255	239	509	389	118	2,623	167	86	2,370
% in Academe	66.4	66.3	68.7	66.1	82.8	58.2	62.0	79.7	68.7	19.2	88.4	71.5
Behavioral Sci Employed	82,692	68,179	6,031	2,544	578	1,145	502	319	2,297	192	327	1,778
% in Academe	62.7	61.8	70.6	60.7	54.3	57.8	67.7	71.2	76.9	47.9	74.9	80.4
Psychology Employed	36,600	31,382	2,050	1,192	260	559	242	131	296	113	18	165
% in Academe	48.0	47.9	50.4	50.3	39.6	48.1	58.3	65.6	53.4	54.9	44.4	53.3
Social Sci Employed	46,092	36,797	3,981	1,352	318	586	260	188	2,001	79	309	1,613
% in Academe	74.4	73.7	81.0	69.8	66.4	67.1	76.5	75.0	80.4	38.0	76.7	83.1

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

TABLE 3.4B Percentage of Academically Employed Humanities Ph.D.s by Field of Ph.D. and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Total Humanities Employed	62,896	48,068	4,882	2,103	920	795	127	261	1,263	632	97	522
% in Academe	84.0	83.7	86.9	81.6	82.2	84.8	81.9	69.3	91.3	93.5	95.9	87.7
History Employed	16,258	13,120	810	464	175	225	13	51	150	22	38	90
% in Academe	78.5	77.3	95.7	81.3	89.1	84.4	100.0	35.3	100.0	100.0	100.0	100.0
English Employed	17,653	14,865	595	462	274	156	19	13	93	*	17	60
% in Academe	87.1	87.7	68.2	81.0	75.9	89.1	84.2	84.6	93.5	*	100.0	90.0
Total Languages Employed	12,505	7,327	2,514	607	404	113	39	51	683	529	14	139
% in Academe	85.5	84.5	87.0	84.3	85.1	86.7	48.7	100.0	90.8	93.6	71.4	87.7
Classics Employed	1,530	1,108	189	38	*	13	*	*	*	*	*	*
% in Academe	77.3	79.5	64.0	50.0	*	100.0	*	*	*	*	*	*
Modern Languages Employed	10,975	6,219	2,325	569	396	100	28	45	676	529	14	132
% in Academe	86.7	85.4	88.9	86.6	86.9	85.0	67.9	100.0	90.7	93.6	71.4	81.8
Other Humanities Employed	16,480	12,756	963	570	67	301	56	146	337	76	28	233
% in Academe	85.0	85.3	90.8	79.3	71.6	82.1	100.0	69.2	87.8	90.8	100.0	85.4
Art History Employed	1,535	1,201	131	19	*	*	*	10	31	*	*	21
% in Academe	83.5	83.7	87.8	47.4	*	*	*	40.0	90.3	*	*	100.0
Music Employed	4,043	3,412	114	188	14	117	18	39	36	9	*	21
% in Academe	84.1	83.9	91.2	80.3	57.1	77.8	100.0	87.2	63.9	66.7	*	52.4
Speech/Theater Employed	3,689	2,891	121	123	*	79	*	38	11	*	*	*
% in Academe	86.3	87.1	100.0	95.9	*	93.7	*	100.0	100.0	*	*	*
Philosophy Employed	5,187	3,939	337	110	8	24	27	51	159	34	21	104
% in Academe	84.1	85.0	87.5	60.9	100.0	54.2	100.0	37.3	89.9	97.1	100.0	85.6
Other Fields Employed	2,026	1,313	260	130	43	76	*	8	100	23	*	77
% in Academe	88.2	87.5	91.9	82.3	69.8	89.5	*	75.0	91.0	100.0	*	88.3

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

PRIMARY WORK ACTIVITY

In 1979, 55 percent of the science and engineering Ph.D.s and 75 percent of the humanities Ph.D.s employed in academe considered teaching their primary work activity[9] (Table 3.5). Another 25 percent of the science and engineering Ph.D.s in academe indicated they were engaged primarily in research, and another 16 percent in management/administration. Of the humanities Ph.D.s in academe, only 5 percent gave research as a primary activity and an additional 12 percent indicated they were engaged in management/administration.

When primary work activity is broken down by racial/ethnic categories, white Ph.D.s, both U.S. and foreign-born, followed the above overall pattern quite closely, but the minorities, most notably blacks, diverged.

In the science and engineering fields, blacks were less frequently engaged in research than any other group: only 15 percent of the U.S.-born blacks and 7 percent of the foreign-born blacks considered research their main work. In the humanities fields, black Ph.D.s were less frequently engaged in teaching than were Ph.D.s from other racial/ethnic groups. More than 73 percent of the humanities Ph.D.s in all other racial/ethnic groups indicated they were engaged in teaching, compared with 57 percent of the U.S.-born, and 52 percent of the foreign-born, black Ph.D.s. At the same time, U.S.-born black humanists reported they were more frequently engaged in management/administration (16 percent) and writing/editing (13 percent) than were other U.S.-born minorities or whites.

Nearly all U.S.-born Hispanics (92 percent) and U.S.-born Asians (89 percent) in the humanities fields considered teaching their primary work. For academically employed Ph.D.s in the sciences and engineering, research was a somewhat more likely primary work activity for U.S.-born Hispanics (30 percent), U.S.-born Asians (33 percent), and foreign-born Asians (31 percent) than it was for U.S.-born whites (23 percent) and blacks (15 percent).

---

[9]See Appendix A, the 1979 SDR Questionnaire. This section is based on answers to item #15A.

galley 12

TABLE 3.5 Primary Work Activity as Reported by Academically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category

Primary Work Activity	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Academically Empl	158,578	124,289	15,375	3,807	880	1,484	932	511	8,488	335	447	7,683
Percentage in:												
Teaching	54.8	55.6	50.4	52.7	51.6	55.6	47.5	55.6	55.5	63.9	70.9	54.4
Research/Dvlp/Design	24.8	23.4	31.4	23.9	29.7	15.0	33.3	23.1	29.9	28.1	6.7	31.1
Management/Admin	15.6	16.2	13.1	17.4	16.9	19.4	16.5	13.7	12.6	5.4	22.4	12.4
[redacted]												
Consulting/Prof. Svcs	1.9	1.9	1.7	3.1	1.4	4.9	1.1	4.7	1.2	2.7	0.0	1.2
Writing/Editing	1.3	1.4	1.4	1.1	0.5	1.0	1.0	2.5	0.0	0.0	0.0	0.0
Mktg/Prod/Insp	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.2
Other	0.7	0.7	0.8	0.7	0.0	1.3	0.6	0.0	0.4	0.0	0.0	0.5
No Report	0.7	0.6	1.2	1.1	0.0	2.7	0.0	0.4	0.2	0.0	0.0	0.2
Humanities												
Academically Empl	52,853	40,247	4,243	1,715	756	674	104	181	1,153	591	93	458
Percentage in:												
Teaching	74.8	75.3	76.2	77.1	92.2	56.5	88.5	84.0	73.6	73.3	51.6	77.9
Research/Dvlp/Design	4.9	4.8	5.4	1.2	1.2	1.0	1.9	1.1	4.4	3.6	1.1	6.3
Management/Admin	11.7	11.3	11.1	10.3	5.0	16.2	5.8	12.7	13.9	13.7	30.1	11.1
[redacted]												
Consulting/Prof. Svcs	0.8	0.9	0.1	2.4	0.3	5.5	1.9	0.0	1.0	0.7	0.0	1.5
Writing/Editing	3.4	3.5	3.0	5.8	0.8	12.9	1.9	2.2	3.5	4.6	7.5	1.3
Mktg/Prod/Insp	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.9	2.0	1.3	1.0	0.3	2.2	0.0	0.0	0.0	0.0	0.0	0.0
No Report	2.4	2.2	2.9	2.3	0.3	5.6	0.0	0.0	3.6	4.2	9.7	1.7

Source: 1979 Survey of Doctorate Recipients.

TENURE AND ACADEMIC RANK, 1960-1978 PH.D.S

According to Table 3.6, the percentages of academically employed 1960-1978 Ph.D.s in science and engineering who were tenured in 1979 were similar across the racial/ethnic groups, with 61 percent for U.S.-born whites, 57 percent for U.S.-born minorities, and 62 percent for foreign-born minorities. The notable exceptions were U.S.-born black Ph.D.s, only 45 percent of whom had achieved tenure, and foreign-born Hispanics, with 43 percent in tenured positions.

In the humanities, the percentage of academically employed 1960-1978 Ph.D.s who were tenured in 1979 was higher for U.S.-born whites (67 percent) and foreign-born minorities (63 percent) than for the U.S.-born minorities (60 percent). Although the percentages are based on small numbers, Table 3.6 shows that 43 percent of foreign-born black Ph.D.s (far higher than other racial/ethnic groups) were in tenure-track positions though not yet tenured.

TABLE 3.6 Tenure Status of Academically Employed 1960-78 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category

Tenure Status by Year of Ph.D.	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total 1960-78 Ph.D.s†	111,202	87,981	9,867	2,904	763	1,007	682	452	6,273	291	332	5,627
% Tenured	62.2	61.3	66.5	57.1	58.2	45.1	63.0	73.0	61.8	42.6	52.7	63.6
% Not Tenured-In Track	24.1	25.1	19.1	28.2	28.6	36.8	22.0	17.9	20.9	38.8	44.0	18.3
% Not In Track	13.7	13.5	14.3	14.7	13.2	18.1	15.0	9.1	17.3	18.6	3.3	18.1
Total 1960-69 Ph.D.s	52,044	39,816	5,664	1,153	264	237	417	235	2,958	89	68	2,801
% Tenured	87.6	87.6	86.1	89.9	95.5	82.7	85.9	97.9	87.5	96.6	100.0	86.9
% Not Tenured-In Track	5.1	5.1	5.9	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	5.0
% Not In Track	7.3	7.2	7.9	10.1	4.5	17.3	14.1	2.1	7.7	3.4	0.0	8.1
Total 1970-78 Ph.D.s	59,158	48,165	4,203	1,751	499	770	265	217	3,315	202	264	2,826
% Tenured	39.9	39.6	40.2	35.5	38.5	33.5	27.2	46.1	38.8	18.8	40.5	40.4
% Not Tenured-In Track	40.8	41.6	36.9	46.8	43.7	48.2	56.6	37.3	35.3	55.9	55.3	31.5
% Not In Track	19.3	18.7	23.0	17.6	17.8	18.3	16.2	16.6	25.9	25.2	4.2	28.1
Humanities												
Total 1960-78 Ph.D.s	41,238	32,090	3,294	1,377	631	523	81	142	982	476	83	412
% Tenured	67.9	66.5	70.1	59.8	60.4	60.4	60.5	54.2	63.0	69.7	41.0	61.4
% Not Tenured-In Track	18.8	19.8	17.1	29.4	26.1	32.1	34.6	31.0	22.5	19.5	43.4	21.1
% Not In Track	13.3	13.7	12.9	10.8	13.5	7.5	4.9	14.8	14.5	10.7	15.7	17.5
Total 1960-69 Ph.D.s	16,183	11,961	1,478	431	205	157	33	36	271	142	*	126
% Tenured	92.8	92.6	93.6	90.7	87.3	91.1	100.0	100.0	98.2	96.5	*	100.0
% Not Tenured-In Track	3.3	3.3	4.5	9.3	12.7	8.9	0.0	0.0	1.8	3.5	*	0.0
% Not In Track	3.9	4.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0
Total 1970-78 Ph.D.s	25,055	20,129	1,816	946	426	366	48	106	711	334	80	286
% Tenured	51.8	51.0	50.9	45.7	47.4	47.3	33.3	38.7	49.6	58.4	38.8	44.4
% Not Tenured-In Track	28.9	29.6	27.3	38.6	32.6	42.1	58.3	41.5	30.4	26.3	45.0	30.4
% Not In Track	19.3	19.4	21.8	15.8	20.0	10.7	8.3	19.8	20.0	15.3	16.3	25.2

*Population estimates based on less than 3 respondents have not been reported.
†Totals include only those individuals academically-employed who reported tenure status.

Source: 1979 Survey of Doctorate Recipients.

The data concerning academic rank in 1979 were similar. Approximately equal percentages of the 1960-1978 science and engineering Ph.D.s in all racial/ethnic groups had achieved the ranks of professor or associate professor (Table 3.7A). A higher percentage of U.S.-born blacks and Hispanics held the rank of assistant professor than was the case for U.S.-born whites and foreign-born minorities, while there was a higher percentage of U.S.-born Asian Ph.D.s in the rank of instructor (7 percent) than was the case for any other racial/ethnic group.

TABLE 3.7A Academic Position Held by 1960-78 Science and Engineering Ph.D.s by Year of Ph.D. and Racial/Ethnic Category

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Academic Rank	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
1960-78 Ph.D.s												
Academically Employed	125,174	98,904	10,765	3,306	830	1,237	748	491	7,684	326	440	6,895
Percentage as:												
Professor	28.1	27.2	37.8	23.6	22.3	18.9	27.3	32.0	26.3	0.0	20.0	28.0
Associate Professor	31.1	31.2	27.5	29.2	27.6	28.5	29.4	33.6	30.5	54.3	31.1	29.4
Assistant Professor	26.9	27.4	22.8	33.3	37.7	37.2	25.0	28.7	28.0	34.4	37.3	26.9
Instructor	1.7	1.7	0.4	2.4	1.0	0.8	7.2	1.6	3.0	3.7	4.8	2.8
Other	9.1	9.2	9.8	8.6	8.6	12.0	5.7	4.1	9.1	7.1	0.0	9.8
No Report	3.1	3.3	1.7	2.9	2.9	2.5	5.3	0.0	3.1	0.6	6.8	3.0
1960-69 Ph.D.s												
Academically Employed	55,056	42,234	5,951	1,171	264	250	422	235	3,153	89	68	2,996
Percentage as:												
Professor	55.3	55.0	58.6	51.6	49.6	51.6	45.3	65.1	57.9	0.0	94.1	58.8
Associate Professor	32.1	31.9	29.2	37.5	44.3	36.4	35.8	34.0	30.9	96.6	5.9	29.5
Assistant Professor	4.2	4.5	4.1	1.3	0.0	5.2	0.0	0.9	3.3	0.0	0.0	3.4
Instructor	0.6	0.4	0.2	3.3	0.0	0.0	9.2	0.0	1.8	0.0	0.0	1.9
Other	5.2	5.3	6.2	2.9	5.3	6.8	0.7	0.0	4.1	3.4	0.0	4.2
No Report	2.6	2.9	1.5	3.4	0.8	0.0	9.0	0.0	2.0	0.0	0.0	2.1
1970-78 Ph.D.s												
Academically Employed	70,118	56,670	4,814	2,135	566	987	326	256	4,531	237	372	3,89*
Percentage as:												
Professor	6.7	6.5	12.1	8.2	9.5	10.6	4.0	1.6	4.3	0.0	6.5	4.4
Associate Professor	30.3	30.7	25.4	24.7	19.8	26.5	21.2	33.2	30.2	38.4	35.8	29.4
Assistant Professor	44.7	44.5	45.9	50.9	55.3	45.3	57.4	54.3	45.2	47.3	44.1	44.9
Instructor	2.5	2.6	0.6	1.9	1.4	1.0	4.6	3.1	3.8	5.1	5.6	3.5
Other	12.3	12.1	14.1	11.7	10.1	13.4	12.3	7.8	12.6	8.4	0.0	14.1
No Report	3.5	3.6	1.9	2.6	3.9	3.1	0.6	0.0	3.9	0.8	8.1	3.7

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

Foreign-born 1960-1978 humanities Ph.D.s were less likely to be full professors than were U.S.-born Ph.D.s (21 percent, as compared with 28 percent of the U.S.-born whites and 29 percent of the U.S.-born minorities). Minority Ph.D.s, both U.S.-born and foreign-born, were more frequently assistant professors than were white Ph.D.s (Table 3.7B).

TABLE 3.7B Academic Positions Held by 1960-78 Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Academic Rank	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
1960-78 Ph.D.s												
Academically Employed	44,216	34,287	3,558	1,492	662	587	95	148	1,067	538	93	425
Percentage as:												
Professor	27.4	27.5	25.7	28.4	25.1	33.2	3.2	40.5	21.1	19.5	0.0	28.2
Associate Professor	33.5	32.7	36.1	28.5	26.6	34.6	26.3	14.2	33.6	37.7	36.6	28.5
Assistant Professor	27.3	28.0	28.2	35.0	43.2	26.2	37.9	31.1	37.2	37.9	52.7	32.7
Instructor	3.4	3.5	2.8	4.2	2.0	1.5	30.5	7.4	4.1	3.2	5.4	3.8
Other	7.6	7.6	6.2	2.7	1.5	3.1	2.1	6.8	3.8	1.3	5.4	6.8
No Report	0.8	0.8	1.0	1.3	1.7	1.4	0.0	0.0	0.2	0.4	0.0	0.0
1960-69 Ph.D.s												
Academically Employed	16,710	12,327	1,508	436	205	162	33	36	271	142	*	126
Percentage as:												
Professor	55.4	56.7	53.2	72.7	74.6	79.6	0.0	97.2	55.7	39.4	*	75.4
Associate Professor	33.6	33.7	34.5	19.5	20.0	17.9	42.4	2.8	35.8	47.9	*	20.6
Assistant Professor	4.8	4.5	4.6	2.5	5.4	0.0	0.0	0.0	6.6	12.7	*	0.0
Instructor	1.0	0.7	0.3	4.4	0.0	0.0	57.6	0.0	0.0	0.0	*	0.0
Other	4.5	4.0	6.2	0.0	0.0	0.0	0.0	0.0	1.8	0.0	*	4.0
No Report	0.6	0.4	1.2	0.9	0.0	2.5	0.0	0.0	0.0	0.0	*	0.0
1970-78 Ph.D.s												
Academically Employed	27,506	21,960	2,050	1,056	457	425	62	112	796	396	90	299
Percentage as:												
Professor	10.4	11.0	5.5	10.1	2.8	15.5	4.8	22.3	9.3	12.4	0.0	8.4
Associate Professor	33.4	32.1	37.2	32.2	29.5	40.9	17.7	17.9	32.8	34.1	34.4	31.8
Assistant Professor	41.0	41.2	45.5	48.4	60.2	36.2	58.1	41.1	47.6	47.0	54.4	46.5
Instructor	4.8	5.0	4.7	4.1	2.8	2.1	16.1	9.8	5.5	4.3	5.6	5.4
Other	9.4	9.7	6.2	3.8	2.2	4.2	3.2	8.9	4.5	1.8	5.6	8.0
No Report	1.0	1.0	0.9	1.4	2.4	0.9	0.0	0.0	0.3	0.5	0.0	0.0

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

When the data for those who received their degrees in the 1970s were examined separately, a slightly different picture emerged. U.S.-born blacks had higher percentages of Ph.D.s in full professorships than did the U.S.-born whites: 11 percent of the U.S.-born black scientists, and just 7 percent of the U.S.-born whites, were professors. In the humanities, 16 percent of the U.S.-born blacks, and 11 percent of the U.S.-born whites, with doctorates were full professors.

4
Nonacademic Employment

Nonacademic employment includes jobs in business/industry, elementary/secondary schools, private foundations, museum/historical societies, research libraries, hospitals/clinics, federal, state or local government, and nonprofit organizations. In February 1979, approximately 46 percent of all Ph.D.s in science and engineering and 15 percent of those in the humanities were employed full or part-time in such nonacademic positions. Because numbers of Ph.D.s employed outside academe, especially in the humanities, are sometimes quite small, this examination of nonacademic employment frequently does not provide statistically reliable estimates.

Again, as shown in Table 4.1, the pattern of minority Ph.D.s departs from the pattern of the total population. In science and engineering fields, 56 percent of the foreign-born, and only 39 percent of the U.S.-born, minority Ph.D.s were employed outside academe. In the humanities fields, however, only 8 percent of the foreign-born minorities and 16 percent of the U.S.-born minorities were employed in nonacademic jobs (Table 4.1).

NONACADEMIC EMPLOYMENT BY SEX

Table 4.1 also shows that women Ph.D.s in science and engineering fields were employed outside the academic sector less frequently than men. Overall, approximately 47 percent of the male science and engineering Ph.D.s had nonacademic jobs, compared with 38 percent of

TABLE 4.1 Percentage of Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category

	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total Employed	295,731	231,029	27,044	6,313	1,423	2,531	1,581	778	19,516	848	638	18,007
% Outside Academe	45.9	45.8	42.5	38.9	36.1	40.8	40.5	34.3	56.1	59.4	29.9	57.0
Men Employed	265,942	207,901	24,455	5,238	1,264	1,889	1,406	679	17,787	717	579	16,468
% Outside Academe	46.9	46.8	43.5	39.8	37.7	41.1	42.3	34.9	57.5	61.9	29.5	58.3
Women Employed	29,789	23,128	2,589	1,075	159	642	175	99	1,729	131	59	1,539
% Outside Academe	37.6	37.6	33.5	34.3	23.9	39.7	26.3	30.3	42.5	45.8	33.9	42.6
Humanities												
Total Employed	62,896	48,068	4,882	2,103	920	795	127	261	1,263	632	97	522
% Outside Academe	15.0	15.6	11.5	16.1	14.0	13.5	18.1	30.7	8.3	6.5	4.1	11.3
Men Employed	47,800	36,756	3,299	1,518	637	579	67	235	896	441	76	379
% Outside Academe	14.7	15.2	10.9	15.5	9.6	13.5	26.9	33.6	7.5	4.5	5.3	11.3
Women Employed	15,096	11,312	1,583	585	283	216	60	26	367	191	21	143
% Outside Academe	16.1	16.8	12.8	17.6	24.0	13.4	8.3	3.8	10.4	11.0	0.0	11.2

Source: 1979 Survey of Doctorate Recipients.

TABLE 4.2 Percentage of Nonacademically Employed 1960-1978 Science, Engineering, and Humanities Ph.D.s by Year of Ph.D. and Racial/Ethnic Category

	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Employed 1960-69 Ph.D.s	95,264	73,396	10,026	1,733	391	412	656	274	5,866	129	75	5,662
% Outside Academe	41.8	42.1	40.1	32.4	32.5	39.3	35.7	14.2	46.1	25.6	9.3	47.1
Employed 1970-78 Ph.D.s	138,831	110,168	8,760	3,679	897	1,706	641	435	12,370	638	556	11,153
% Outside Academe	49.3	48.4	44.8	41.6	36.9	41.3	49.1	41.1	62.9	62.5	33.1	64.5
Humanities												
Employed 1960-69 Ph.D.s	18,425	13,493	1,606	491	214	171	51	55	290	142	*	145
% Outside Academe	8.8	8.6	6.0	11.0	4.2	4.7	35.3	34.5	6.6	0.0	*	13.1
Employed 1970-78 Ph.D.s	34,288	27,649	2,556	1,334	603	506	67	158	869	434	94	329
% Outside Academe	19.0	20.1	16.9	17.6	18.4	14.4	7.5	29.1	7.8	8.8	4.3	7.6

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

the female science and engineering Ph.D.s, and the percentages for male and female U.S.-born white Ph.D.s were exactly the same. Both male and female U.S.-born minority Ph.D.s, however, were less likely to hold nonacademic jobs; just 40 percent of U.S.-born minority men and 34 percent of the women were nonacademically employed in 1979. The highest rate of nonacademic employment occurred among the foreign-born minority men, approximately 58 percent of whom were employed outside academe. Foreign-born minority women also had a higher percentage of nonacademic employment (43 percent) than did the other groups of female Ph.D.s.

In the humanities fields, much smaller percentages of both men (15 percent) and women (16 percent) were employed in nonacademic jobs than was the case in science and engineering. Again, male and female U.S.-born white Ph.D.s had virtually the same proportion in nonacademic jobs as the total Ph.D. population, but the number of minority Ph.D. humanists employed in nonacademic jobs was too small for statistically reliable estimates of males and females by racial/ethnic categories.

YEAR OF PH.D.

Ph.D.s who received their degrees in the 1970s had a higher percentage of nonacademic employment than those who received their degrees in the 1960s (Table 4.2). In the science and engineering fields, 49 percent of the 1970s graduates were nonacademically employed, compared with 42 percent of the 1960s graduates. This interesting difference between nonacademic employment of science and engineering doctorate recipients in the 1960s and the 1970s was most pronounced for the foreign-born minorities; employment outside academe was as high as 63 percent among these groups in the 1970s, and only 46 percent in the 1960s.

In the humanities fields, 19 percent of the 1970s Ph.D.s were nonacademically employed, compared with 9 percent of the 1960s graduates. Once again, the proportion of white Ph.D.s was similar to that of the total population, but the numbers of minority Ph.D.s were too small to provide comparable estimates by racial/ethnic categories.

TABLE 4.3 Nonacademically Employed Science, Engineering, and Humanities Ph.D.s, with Percentages, by Ph.D. Field and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Nonacademically Employed	135,810	105,899	11,495	2,454	514	1,032	641	267	10,955	504	191	10,260
Percentages in:												
EMP Fields	58.8	56.4	68.2	37.0	34.0	28.6	49.8	44.9	81.6	45.8	45.5	84.0
[redacted]												
Life Sciences	18.8	19.4	16.9	23.6	20.2	25.3	25.0	20.6	13.6	34.7	11.5	12.6
[redacted]												
Behavioral Sciences	22.4	24.3	14.9	39.3	45.7	46.1	25.3	34.5	4.8	19.4	42.9	3.4
[redacted]												
Humanities												
Nonacademically Employed	9,447	7,487	563	339	129	107	23	80	105	41	*	59
Percentages in:												
History	35.3	38.7	5.3	24.5	14.7	29.0	0.0	41.3	0.0	0.0	*	0.0
English	22.6	23.3	27.0	24.8	51.2	12.1	13.0	2.5	5.7	0.0	*	10.2
Languages	17.6	14.4	51.9	18.9	24.0	12.1	87.0	0.0	55.2	82.9	*	32.2
[redacted]												
Other Humanities	24.5	23.7	15.8	31.9	10.1	46.7	0.0	56.3	39.0	17.1	*	57.6
[redacted]												

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

FIELD OF PH.D.

Over half (56 percent) of the U.S.-born minority Ph.D.s in science or engineering employed in nonacademic jobs had earned their degrees in the biological and behavioral sciences (Table 4.3). In this respect they were unlike the U.S.-born whites and foreign-born minorities employed outside academe: only 37 percent of the U.S.-born whites and 12 percent of the foreign-born minorities had earned their degrees in these fields. The U.S.-born whites and foreign-born minority Ph.D.s working in nonacademic jobs were much more likely to have earned their degrees in one of the EMP fields (engineering, mathematics, and physical sciences) with the proportion of U.S.-born white Ph.D.s at 56 percent and foreign-born minorities at 82 percent. In fact, out of the latter group, over half (54 percent) of the nonacademically employed foreign-born Asians earned their degrees in engineering alone.

Tables 4.4A and 4.4B present the proportion of Ph.D.s employed in nonacademic jobs for each field of science, engineering, and humanities. Approximately half of the Ph.D.s in the physical sciences, engineering, and psychology were working in nonacademic jobs in 1979. In contrast, only about one-fourth of the Ph.D.s in mathematics and the social sciences were nonacademically employed. In general, the rate of nonacademic employment within fields was similar for all racial/ethnic groups when the numbers of Ph.D.s were sufficient to make comparisons. The widest variations within fields occurred among minority Ph.D.s in chemistry and engineering; approximately one-half of the U.S.-born minorities were nonacademically employed, compared with three-fourths of the foreign-born minorities. Foreign-born engineers had the largest proportion (79 percent) in nonacademic employment.

In contrast to the science/engineering fields, 15 percent of the Ph.D.s in the total humanities fields were employed in nonacademic jobs.

TABLE 4.4A Percentage of Nonacademically Employed Science and Engineering Ph.D.s by Field of Ph.D. and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
				U.S.-Born					Foreign-Born			
		U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Total Sci/Engin Employed	295,731	231,029	27,044	6,313	1,423	2,531	1,581	778	19,516	848	638	18,007
% Outside Academe	45.9	45.8	42.5	38.9	36.1	40.8	40.5	34.3	56.1	59.4	29.9	57.0
EMP Fields Employed	142,110	105,991	15,510	1,992	445	704	579	264	13,035	387	148	12,477
% Outside Academe	56.2	56.3	50.5	45.6	39.3	41.9	55.1	45.5	68.6	59.7	58.8	69.1
Mathematics Employed	16,035	12,137	1,620	296	89	153	23	31	1,082	53	*	985
% Outside Academe	23.3	24.4	19.5	19.3	4.5	19.6	17.4	61.3	23.2	11.3	*	24.9
Computer Sci Employed	1,783	1,375	144	23	*	*	*	16	170	17	*	153
% Outside Academe	54.7	48.7	88.2	13.0	*	*	*	18.8	71.8	88.2	*	69.9
Physics/Astronomy Employed	25,611	19,145	3,223	402	85	156	85	76	1,439	16	*	1,423
% Outside Academe	48.7	51.3	41.1	49.5	28.2	57.1	45.9	61.8	42.5	68.8	*	42.2
Chemistry Employed	41,970	32,356	4,784	761	138	266	272	85	2,773	168	71	2,534
% Outside Academe	65.4	65.9	62.6	47.8	62.3	48.5	49.6	16.5	74.0	72.0	52.1	74.7
Environmental Sci Employed	9,729	8,073	943	100	36	13	24	27	338	8	*	324
% Outside Academe	53.0	53.3	43.9	62.0	41.7	92.3	79.2	59.3	65.1	25.0	*	67.3
Engineering Employed	46,982	32,905	4,796	410	94	116	171	29	7,233	125	*	7,058
% Outside Academe	64.1	62.6	55.6	54.6	48.9	30.2	71.3	72.4	78.6	60.8	*	78.8
Life Sci Employed	70,929	56,859	5,503	1,777	400	682	500	195	4,184	269	163	3,572
% Outside Academe	36.0	36.0	35.3	32.6	26.0	38.3	32.0	28.2	35.6	65.1	13.5	34.4
Agricultural Sci Employed	13,430	11,046	795	244	67	53	65	59	914	74	59	781
% Outside Academe	42.5	42.5	49.6	21.7	31.3	9.4	4.6	40.7	43.1	41.9	20.3	44.9
Medical Sci Employed	7,949	5,929	754	278	94	120	46	18	647	28	18	601
% Outside Academe	42.8	42.7	43.5	42.1	44.7	42.5	37.0	38.9	42.3	32.1	0.0	44.1
Biological Sci Employed	49,550	39,884	3,954	1,255	239	509	389	118	2,623	167	86	2,370
% Outside Academe	33.1	33.3	30.9	32.7	17.2	40.3	36.0	20.3	31.3	80.8	11.6	28.5
Behavioral Sci Employed	82,692	68,179	6,031	2,544	578	1,145	502	319	2,297	192	327	1,778
% Outside Academe	36.7	37.7	28.4	37.9	40.7	41.6	32.3	28.8	22.9	51.0	25.1	19.4
Psychology Employed	36,600	31,382	2,050	1,192	260	559	242	131	296	113	18	165
% Outside Academe	51.3	51.5	48.1	48.7	55.4	51.9	41.7	34.4	46.6	45.1	55.6	46.7
Social Sci Employed	46,092	36,797	3,981	1,352	318	586	260	188	2,001	79	309	1,613
% Outside Academe	25.1	25.9	18.2	28.5	28.6	31.7	23.5	25.0	19.3	59.5	23.3	16.6

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

TABLE 4.4B Percentage of Nonacademically Employed Humanities Ph.D.s by Field of Ph.D. and Racial/Ethnic Category

Ph.D. Field	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Total Humanities Employed	62,896	48,068	4,882	2,103	920	795	127	261	1,263	632	97	522
% Outside Academe	15.0	15.6	11.5	16.1	14.0	13.5	18.1	30.7	8.3	6.5	4.1	11.3
History Employed	16,258	13,120	810	464	175	225	13	51	150	22	38	90
% Outside Academe	20.5	22.1	3.7	17.9	10.9	13.8	0.0	64.7	0.0	0.0	0.0	0.0
English Employed	17,653	14,865	595	462	274	156	19	13	93	*	17	60
% Outside Academe	12.1	11.7	25.5	18.2	24.1	8.3	15.8	15.4	6.5	*	0.0	10.0
Total Languages Employed	12,505	7,327	2,514	607	404	113	39	51	683	529	14	139
% Outside Academe	13.3	14.7	11.6	10.5	7.7	11.5	51.3	0.0	8.5	6.4	28.6	13.7
Classics Employed	1,530	1,108	189	38	*	13	*	*	*	*	*	*
% Outside Academe	21.5	19.1	36.0	50.0	*	0.0	*	*	*	*	*	*
Modern Languages Employed	10,975	6,219	2,325	569	396	100	28	45	676	529	14	132
% Outside Academe	12.2	13.9	9.6	7.9	5.8	13.0	32.1	0.0	8.6	6.4	28.6	14.4
Other Humanities Employed	16,480	12,756	963	570	67	301	56	146	337	76	28	233
% Outside Academe	14.0	13.9	9.2	18.9	19.4	16.6	0.0	30.8	12.2	9.2	0.0	14.6
Art History Employed	1,535	1,201	131	19	*	*	*	10	31	*	*	21
% Outside Academe	15.4	16.0	12.2	52.6	*	*	*	60.0	9.7	*	*	0.0
Music Employed	4,043	3,412	114	188	14	117	18	39	36	9	*	21
% Outside Academe	15.0	15.7	8.8	16.5	0.0	22.2	0.0	12.8	36.1	33.3	*	47.6
Speech/Theater Employed	3,689	2,891	121	123	*	79	*	38	11	*	*	*
% Outside Academe	12.9	12.1	0.0	4.1	*	6.3	*	0.0	0.0	*	*	*
Philosophy Employed	5,187	3,939	337	110	8	24	27	51	159	34	21	104
% Outside Academe	14.7	13.5	12.5	39.1	0.0	45.8	0.0	62.7	10.1	2.9	0.0	14.4
Other Fields Employed	2,026	1,313	260	130	43	76	*	8	100	23	*	77
% Outside Academe	11.4	12.5	8.1	14.6	30.2	5.3	*	25.0	9.0	0.0	*	11.7

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

The largest percentage of nonacademic employment occurred in the field of history (22 percent) for U.S.-born white humanities doctorates and in the fields of history and English (18 percent each) for U.S.-born minorities. Most other field groups did not have numbers of Ph.D.s in nonacademic jobs that were large enough to provide reliable estimates.

EMPLOYMENT SECTOR

More than half (60 percent) of the total number of 135,800 science and engineering Ph.D.s working in nonacademic jobs were employed in business and industry (Table 4.5). Foreign-born Asians far exceeded the overall proportion with 80 percent in business and industry, whereas the 30 percent of U.S.-born black Ph.D.s was the lowest in business and industry. On the other hand, more U.S.-born black Ph.D.s (33 percent) than any other Ph.D. group were employed by the federal government.

U.S.-born blacks (14 percent) were also employed in hospitals and clinics more frequently than were other Ph.D groups while the percentage of U.S.-born Hispanics (29 percent) employed in nonprofit organizations was higher than that of any other group.

Table 4.5 also shows that approximately one-third of the very small total number of nonacademically employed humanities Ph.D.s were employed by business or industry in 1979. Humanities Ph.D.s working in jobs at elementary/secondary schools or nonprofit organizations combined to make up another third of the nonacademically employed.

PRIMARY WORK ACTIVITY

In 1979, research and development, including its management and administration, was the primary work activity reported by most nonacademically employed science and engineering Ph.D.s: 62 percent of the U.S.-born whites, 59 percent of the U.S.-born minorities, and

TABLE 4.5 Employment Sector of Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category

Employment Sector	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total Nonacademically Empl	135,810	105,899	11,495	2,454	514	1,032	641	267	10,955	504	191	10,260
Percentage in:												
Elem./Sec. Schools	1.5	1.6	1.0	2.4	1.6	4.5	0.6	0.0	0.4	0.0	0.0	0.4
Business/Industry	60.0	57.6	68.5	47.2	46.1	30.3	71.5	56.2	78.4	51.0	49.2	80.2
U.S. Government	18.6	20.1	13.6	21.8	12.3	33.4	9.4	25.5	9.6	23.4	20.9	8.7
State/Local Govt	4.2	4.6	1.5	5.7	5.3	6.7	4.1	7.1	2.5	4.8	0.5	2.5
Hosp./Clinic	6.6	7.0	5.6	9.7	5.1	14.1	9.7	1.9	2.7	7.7	1.6	2.5
Non-Profit Organ.	7.1	7.3	6.9	12.2	29.2	9.0	4.8	9.4	3.4	3.0	7.3	3.4
Other	2.0	1.8	3.0	1.0	0.6	2.0	0.0	0.0	3.0	10.1	20.4	2.3
Humanities												
Total Nonacademically Empl	9,447	7,487	563	339	129	107	23	80	105	41	*	59
Percentage in:												
Elem./Sec. Schools	16.8	17.0	29.1	19.5	7.0	39.3	0.0	18.8	30.5	34.1	*	30.5
Business/Industry	37.0	37.6	35.7	43.4	53.5	6.5	60.9	71.3	33.3	48.8	*	18.6
U.S. Government	11.1	11.0	3.0	13.0	8.5	22.4	39.1	0.0	1.9	0.0	*	1.7
State/Local Govt	6.0	6.3	2.7	2.9	4.7	3.7	0.0	0.0	1.9	4.9	*	0.0
Hosp./Clinic	0.6	0.3	0.0	0.6	0.0	0.0	0.0	2.5	15.2	2.4	*	25.4
Non-Profit Organ.	20.4	19.6	22.7	12.4	19.4	15.9	0.0	0.0	13.3	4.9	*	20.3
Other	8.1	8.3	6.7	8.3	7.0	12.1	0.0	7.5	3.8	4.9	*	3.4

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

TABLE 4.6 Primary Work Activity as Reported by Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Racial/Ethnic Category

	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total Nonacademically Empl	135,810	105,899	11,495	2,454	514	1,032	641	267	10,955	504	191	10,260
Percentage in:												
Teaching	1.0	1.1	0.6	1.6	0.6	2.4	1.7	0.0	0.5	5.6	0.0	0.3
Research/Dvlp/Design	37.6	36.8	37.9	33.3	28.6	28.2	39.0	47.9	48.0	56.7	70.7	47.1
Management/Admin	33.5	33.9	31.6	37.4	36.6	42.1	37.0	22.1	34.6	19.8	20.4	35.6
[redacted]												
Consulting/Prof. Svcs	16.0	16.5	15.7	15.8	18.9	15.7	12.0	19.1	10.0	12.1	7.3	9.9
Writing/Editing	2.2	2.2	1.9	2.4	0.4	4.7	0.5	1.9	0.8	0.0	0.0	0.8
Mktg/Prod/Insp	4.9	4.8	6.4	4.8	3.7	2.4	8.0	9.0	4.0	2.6	0.5	4.1
Other	3.4	3.5	3.4	2.9	6.6	2.4	1.7	0.0	1.6	1.0	0.0	1.7
No Report	1.3	1.1	2.4	1.9	4.7	2.1	0.2	0.0	0.6	2.2	1.0	0.6
Humanities												
Total Nonacademically Empl	9,447	7,487	563	339	129	107	23	80	105	41	*	59
Percentage in:												
Teaching	14.7	14.7	22.9	12.1	1.6	20.6	0.0	21.3	33.3	35.6	*	33.9
Research/Dvlp/Design	5.7	6.4	5.3	2.7	7.0	0.0	0.0	0.0	1.0	0.0	*	0.0
Management/Admin	22.1	20.7	15.6	38.3	21.7	36.4	30.4	70.0	25.7	51.2	*	10.2
[redacted]												
Consulting/Prof. Svcs	12.3	12.5	13.9	4.4	10.1	1.9	0.0	0.0	20.0	0.0	*	35.6
Writing/Editing	17.0	17.5	15.3	19.5	41.1	4.7	8.7	7.5	6.7	0.0	*	11.9
Mktg/Prod/Insp	8.5	7.7	14.7	9.1	18.6	3.7	13.0	0.0	1.9	0.0	*	3.4
Other	14.6	15.8	8.7	13.9	0.0	32.7	47.8	1.3	5.7	12.2	*	1.7
No Report	5.1	4.7	3.6	0.0	0.0	0.0	0.0	0.0	5.7	0.0	*	3.4

*Population estimates based on less than 3 respondents have not been reported.

Source: 1979 Survey of Doctorate Recipients.

82 percent of the foreign-born minorities were so employed (Table 4.6). Consulting and professional services was the second most frequently reported primary work activity for all nonacademically employed science and engineering Ph.D.s.

The data in Table 4.6 also show that, among humanities Ph.D.s employed outside academe, management/administration was considered the primary work activity of 38 percent of the U.S.-born minorities, 26 percent of the foreign-born minorities, and 21 percent of the U.S.-born whites. Teaching, writing and editing, and consulting or professional services were also frequent primary work activities for humanities Ph.D.s. Unfortunately, the number of nonacademically employed humanists was too small to measure differences precisely by racial/ethnic categories.

5
Salaries

In general, estimates based on the responses to the SDR questionnaire indicated that the median salaries of science, engineering, and humanities Ph.D.s varied little from one racial/ethnic group to another, when year of degree and type of employment were about the same. Overall, such differences amounted to less than 5 percent. When the data were disaggregated by type of employer, field of degree, years of professional experience, and sex, however, greater salary differences came to light.[10]

SALARIES IN ACADEMIC EMPLOYMENT

Academically employed U.S.-born white Ph.D.s in science and engineering had a higher median salary ($26,200) than that of academically employed Ph.D.s who were members of other racial/ethnic groups (Table 5.1). This pattern varied little within the various field groups. The only instance in the various science and engineering field groups where the median academic salary of another U.S.-born group was higher than that of the U.S.-born whites was the case of the U.S.-born Asian Ph.D.s in the life sciences: their median annual

[10] Median annual salaries were computed only for those Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multiplied by 11/9 to adjust for a full year scale. Medians are not reported for cells where fewer than 10 sample individuals reported salaries or for cells having an estimated median salary sampling error exceeding ± $2,000.

salary of $30,100 was the highest in any racial/ethnic group. Median salaries for U.S.-born whites, U.S.-born blacks, and foreign-born Asian Ph.D.s employed in the EMP fields (engineering, mathematics, and physical sciences) were higher than those in the life sciences or behavioral sciences. As noted in Chapter 3, however, fewer U.S.-born blacks obtained Ph.D.s in EMP fields than did U.S.-born whites and foreign-born Asians. Blacks in science and engineering were more likely to hold degrees in the behavioral sciences, where median salaries were estimated to be the lowest for all racial/ethnic groups.

TABLE 5.1 Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Field of Doctorate and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Field of Doctorate	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total	$26.4	$26.2	$28.7	$24.6	$24.0	$24.7	$25.6	$25.1	$24.9			$25.1
EMP*	27.4	27.2	28.9	24.6	22.7	26.1			25.3	$25.3		25.9
Life Sciences	26.2	26.1	28.6	25.9	24.5	25.0	30.1	25.4	24.3	21.5	$20.6	24.7
Behavioral Sciences	25.5	25.3	28.2	23.1	22.7	23.6	22.4		25.3	21.5		25.1
Humanities												
Total	23.2	22.8	23.2	24.1		24.8		24.7	22.9	23.1	19.7	23.0
History	24.4	24.2	25.1	24.4		26.5						
English Lang/Lit.	22.5	22.4	23.6						19.1			
Other Languages	22.2	21.6	22.1			24.2			22.6	22.9		22.0
Other Humanities	23.8	23.1	24.0	24.6	19.7	25.5			22.5			22.3

*EMP = Engineering, Mathematics, and the Physical Sciences.

Source: 1979 Survey of Doctorate Recipients.

In the humanities, median salaries for Ph.D.s were lower overall than those in science and engineering, and the pattern varied as well. Table 5.1 shows that academically employed U.S.-born blacks had a median salary of $24,800, approximately 10 percent higher than the $22,800 earned by U.S.-born whites. In the fields of other languages and other humanities, the salaries of U.S.-born black Ph.D.s were approximately 10 percent higher than those of foreign-born minority humanists. The numbers of other U.S.-born minorities with humanities doctorates and working in academe were too low in most racial/ethnic groups to produce reliable estimates of median annual salaries.

Table 5.2 shows the median annual salaries of academically employed scientists, engineers, and humanists by academic rank. In the sciences and engineering, medians in all racial/ethnic groups were within 5 percent of one another, except at the highest and lowest academic levels. U.S.-born white Ph.D.s who were full professors had the highest median annual salary ($33,100), which was 10 percent higher than that of U.S.-born minority groups except U.S.-born Asians ($32,100). U.S.-born white Ph.D.s who were instructors had a median salary of $20,900, which was nearly 20 percent higher than the median salaries of all U.S.-born minorities.

Median salaries of minority and white full professors in the humanities were similar (Table 5.2), but at lower ranks, U.S.-born black humanists had median salaries nearly 10 percent higher than U.S.-born whites (associate professor, $24,500, and assistant professor, $19,500, compared with $22,500 and $18,000 for whites). U.S.-born Hispanics and Asians with the rank of assistant professor had the lowest median salaries ($16,500 and $16,000, respectively).

TABLE 5.2 Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Academic Rank and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Academic Rank	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Professor	$33.3	$33.1	$35.3	$30.7	$30.6	$30.2	$32.1	$30.4	$32.1			$32.5
Associate Professor	25.0	24.9	25.9	24.6	24.0	25.3		24.7	25.5	$25.6		25.1
Assistant Professor	20.6	20.5	20.7	20.7	20.6	21.3	20.5	19.6	20.9	19.5	$20.4	21.2
Instructor	20.2	20.9		17.7					18.3			18.1
Other	22.4	22.9	21.9	26.7	27.3	27.3			18.4			18.4
Humanities												
Professor	29.8	29.3	31.5	30.5		30.3			30.1	30.3		
Associate Professor	22.5	22.5	22.2	23.9		24.5			23.9	24.3		22.0
Assistant Professor	18.1	18.0	17.8	17.8	16.5	19.5	16.0		18.7	18.9	18.2	18.4
Instructor	18.1	16.0										
Other	21.3	20.2	23.7									

Source: 1979 Survey of Doctorate Recipients.

TABLE 5.3 Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Years of Professional Experience and Racial/Ethnic Category (in thousands of dollars)

Years of Experience	Grand Total	Whites		Minorities								
		U.S. Born	Frgn Born	U.S.-Born					Foreign-Born			
				Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
0-1 Years	$18.7	$18.7										
2-5 Years	20.0	19.9	$20.6	$19.9	$19.6	$20.8	$19.2	$19.2	$20.0	$18.6		$19.9
6-10 Years	22.9	22.9	23.4	22.5	24.3	22.8	21.4		22.6	25.0		22.5
11-15 Years	26.5	26.5	27.7	25.5		24.3		25.4	26.0			25.9
16-20 Years	29.4	29.3	30.4	28.1		26.4			29.4			29.4
21-25 Years	31.1	31.1	31.8	28.8		28.1			30.6			
26-30 Years	34.4	34.0	36.8	30.9		42.0						
Over 30 Years	36.2	35.9	38.6	36.3		34.6						
Humanities												
0-1 Years	17.1	17.2										
2-5 Years	17.0	17.0	16.5			17.8			17.2	17.5		
6-10 Years	19.8	19.8	19.2	19.3	17.2	22.7			20.5			20.7
11-15 Years	22.5	22.5	21.6		19.3					22.8		
16-20 Years	24.4	24.2	23.8	26.1					26.4			
21-25 Years	27.5	27.5	25.2	26.0		24.5						
26-30 Years	29.7	29.5		33.4		28.6			30.3			
Over 30 Years	31.0	30.8										

Source: 1979 Survey of Doctorate Recipients.

Table 5.3 gives the estimated median salaries for academically employed Ph.D.s in the sciences, engineering, and the humanities by years of professional experience.[11] It shows that for most U.S.-born minority and white scientists and engineers who had 0 to 20 years of experience, median salaries were similar. The exception was the group of U.S.-born black scientists and engineers with 16 to 20 years of professional experience, whose median salary of $26,400 was approximately 10 percent lower than the $29,300 earned by whites with comparable years of experience. The difference in median salaries between U.S.-born white and minority Ph.D.s widened even more for those with 21 to 30+ years of experience. These data should be interpreted with caution in light of the small number of U.S.-born minority Ph.D.s with more than 20 years of experience.

Data in Table 5.3 on Ph.D.s in the humanities suggest that median annual salaries show little substantial difference between whites and minorities with comparable years of experience, except at the level of 26 to 30 years. Here, academically employed U.S.-born white humanists had a median annual salary of $29,500, compared with the $33,400 earned by their U.S.-born minority counterparts.

---

[11] The median time registered in Ph.D. programs is similar for all groups: however, data from the Survey of Earned Doctorates show there is considerable variation among the groups in the total time from B.A. to Ph.D. For example, in 1978 the total time from B.A. to Ph.D. for black Ph.D.s in the EMP and life science fields was approximately 3 years longer than for whites in those fields. Because of the variation in median B.A.-Ph.D. time lapse, it was felt that the academic rank data might present an inaccurate minority/white salary comparison, and that a more accurate picture might be revealed by distributing the academic salaries by years of professional experience as well. The data, however, are not adequate to report the salaries of each group by years of experience for each academic rank.

Differences between the annual median salaries of male and female Ph.D.s reflect a more consistent pattern (Table 5.4). Irrespective of racial/ethnic group, men who were employed in academe had median salaries at least 10 percent higher than those of women similarly employed. The highest salaries for women in academe were earned by U.S.-born blacks with science or engineering degrees whose salaries of $23,700 were more than 10 percent higher than U.S.-born white women ($22,100). U.S.-born white men in science and engineering had a median annual salary of $26,700, which was approximately the same as that of U.S.-born Asian men, but slightly higher than that of other U.S.-born minority men. In the humanities, the median salary of U.S.-born black men ($25,800) was somewhat higher than that of U.S.-born white men ($23,800).

TABLE 5.4 Median Annual Salaries of Full-Time Academically Employed Science, Engineering, and Humanities Ph.D.s by Sex and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Sex	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Male	$26.9	$26.7	$29.5	$25.1	$24.2	$25.0	$26.1	$25.4	$25.4	$25.3		$25.5
Female	22.2	22.1	22.6	22.5	22.0	23.7	20.3	20.0	20.8	20.6		20.9
Humanities												
Male	24.1	23.8	24.2	24.6		25.8		24.6	23.2	24.0		23.0
Female	20.2	19.9	20.1	20.4	19.5	23.0			22.2	22.3		22.8

Source: 1979 Survey of Doctorate Recipients.

SALARIES IN NONACADEMIC EMPLOYMENT

Tables 5.5 through 5.8 give a description of the salary patterns for all groups of Ph.D.s in science and engineering who were employed outside academe in 1979. Ph.D.s in the humanities are included only in the table and discussion concerning salaries by type of employer. In all other cases (years of experience, field of doctorate, and sex),

the numbers on Ph.D.s in the humanities who were nonacademically employed were too small to allow analysis of median annual salaries.

For those science and engineering Ph.D.s who were employed in nonacademic jobs, there were notable variations in the median salaries of U.S.-born minorities and whites when the data were disaggregated in various ways. In general, however, the data show that nonacademic salaries are higher than academic.

Table 5.5 indicates that most of the nonacademically employed science and engineering Ph.D.s were working in business and industry, where the median salary of U.S.-born minorities ($36,500) was about 5 percent higher than that of U.S.-born whites ($34,800), and as much as 20 percent higher than that of foreign-born minorities ($30,200). U.S.-born minorities employed in elementary and secondary schools had a median salary ($28,500) that was over 10 percent higher than that of U.S.-born whites ($25,100).

TABLE 5.5 Median Annual Salaries of Full-Time Nonacademically Employed Science, Engineering, and Humanities Ph.D.s by Type of Employer and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Type of Employer	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Science/Engineering												
Total Nonacademic	$32.5	$32.7	$35.1	$31.7	$31.3				$29.8			$30.0
Business/Industry	33.8	34.8	35.4	36.5					30.2			30.2
U.S. Government	33.4	33.2	36.3				$29.7		28.6			29.3
Elem./Sec. Schools	25.5	25.1		28.5								
Other Nonacademic	27.4	27.0	32.3	26.1		28.8			25.0			25.0
Humanities												
Total Nonacademic	30.3	19.7			17.3				20.2			
Business/Industry	18.5	18.2		17.1								
U.S. Government	28.1	23.2										
Elem./Sec. Schools	22.7	21.7		27.6								
Other Nonacademic	19.4	18.9	20.7									

Source: 1979 Survey of Doctorate Recipients.

The data on humanists by type of nonacademic employer are based on small numbers, but show that U.S.-born white humanists working in business and industry had a median salary of $18,200, slightly higher than that of similarly employed U.S.-born minorities ($17,100). In elementary and secondary schools, however, the white Ph.D. median salary of $21,700 was approximately 20 percent lower than the $27,600 earned by similarly employed U.S.-born minorities (Table 5.5).

The distribution of salaries of nonacademically employed science and engineering Ph.D.s by years of professional experience (Table 5.6) suggests that the very small number of U.S.-born minority Ph.D.s with 11 to 15 years of professional experience had median salaries markedly higher than U.S.-born whites with comparable years of experience ($39,800 and $34,400, respectively). There were too few U.S.-born minority scientists and engineers with more than 15 years in nonacademic employment to make meaningful, comparisons between minority and white Ph.D.s at this level of professional experience.

TABLE 5.6 Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Years of Professional Experience and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Years of Experience	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
0-1 Years	$22.2	$20.9							$25.4			$25.4
2-5 Years	25.0	24.6	$26.2	$23.5		$23.1	$24.1	$24.2	27.1			27.1
6-10 Years	29.6	29.4	30.3	29.8	$30.1	30.4	25.8		29.1	$28.4		29.5
11-15 Years	34.3	34.4	33.6	39.8		39.3	41.0		32.8			33.1
16-20 Years	36.2	36.1	38.0						35.1			35.4
21-25 Years	38.8	38.3	40.6						36.5			36.5
26-30 Years	40.9	41.1										
Over 30 Years	41.3	41.3										

Source: 1979 Survey of Doctorate Recipients.

The data on median annual salaries are disaggregated by field of doctorate in Table 5.7. It shows that the median salaries of U.S.-born minorities and whites in the life and behavioral sciences

TABLE 5.7 Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Field of Doctorate and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Field of Doctorate	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
EMP	$33.5	$34.1	$36.0	$36.8	$31.4				$30.2	$30.1		$30.2
Life Sciences	30.9	31.1	33.4	30.1		$30.9	$26.8		26.4	28.4		26.0
Behavioral Sciences	30.2	29.7	33.1			28.7			30.4			

Source: 1979 Survey of Doctorate Recipients.

were nearly identical, but the median salary of U.S.-born minorities in the life sciences ($30,100) was over 10 percent higher than that of the foreign-born minorities ($26,400). In the EMP fields, where salaries tend to be higher overall, U.S.-born minorities had median salaries of $36,800, nearly 10 percent higher than those of the U.S.-born whites ($34,100) and about 20 percent higher than those of the foreign-born minorities ($30,200).

Table 5.8 brings together the available data on sex differences in median salaries. There are no data on humanities Ph.D.s because the number employed outside academe was too small to report by sex. In the science and engineering fields, however, the difference between the salaries of men and women in nonacademic employment, regardless of racial/ethnic group, was greater than the male-female difference among the academically employed (to compare, see Table 5.4). In all cases--U.S.-born whites, U.S.-born minorities, and foreign-born minorities--median salaries for male Ph.D.s employed in nonacademic jobs were much higher than those for women. The difference between male and female salaries of U.S.-born minorities was over 25 percent, the largest of all.

TABLE 5.8 Median Annual Salaries of Full-Time Nonacademically Employed Science and Engineering Ph.D.s by Sex and Racial/Ethnic Category (in thousands of dollars)

		Whites		Minorities								
				U.S.-Born					Foreign-Born			
Sex	Grand Total	U.S. Born	Frgn Born	Total	Hisp	Black	Asian	Am In	Total	Hisp	Black	Asian
Male	$33.0	$33.2	$35.8	$34.1	$31.3	$34.3		$38.6	$30.0	$29.0		$30.2
Female	25.5	25.4	26.0	25.1		25.1	$25.5		24.5			24.3

Source: 1979 Survey of Doctorate Recipients.

Appendix A

1979 Survey of Doctorate Recipients Questionnaire

OMB No. 099-NO394

1979 SURVEY OF DOCTORATE RECIPIENTS

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION, THE NATIONAL ENDOWMENT FOR THE HUMANITIES, THE NATIONAL INSTITUTES OF HEALTH, AND THE DEPARTMENT OF ENERGY

NOTE: THIS INFORMATION IS SOLICITED UNDER THE AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION ACT OF 1950, AS AMENDED. ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL AND USED FOR STATISTICAL PURPOSES ONLY. INFORMATION WILL BE RELEASED ONLY IN THE FORM OF STATISTICAL SUMMARIES OR IN A FORM WHICH DOES NOT IDENTIFY INFORMATION ABOUT ANY PARTICULAR PERSON. YOUR RESPONSE IS ENTIRELY VOLUNTARY AND YOUR FAILURE TO PROVIDE SOME OR ALL OF THE REQUESTED INFORMATION WILL IN NO WAY ADVERSELY AFFECT YOU.

_____

_____

_____

If your name and address are incorrect, please enter correct information above. Include ZIP Code (79)

If there is an alternate address through which you can always be reached, please provide it on the line below.

C/O Number Street City State ZIP Code (80)

Please check the pre-printed information in questions 1 - 6 to be certain that it is correct and complete.

1. Date of Birth Mo. Day Year (10-14)	2. State or Foreign Country of Birth (15-16)	3. Citizenship (17)	4. Sex (20)
		0 ☐ U.S.A. 1 ☐ Non-U.S.A., specify country _____ (18-19)	1 ☐ M 2 ☐ F

5. What is your racial background? (21)
0 ☐ American Indian or Alaskan Native
1 ☐ Asian or Pacific Islander
2 ☐ Black
3 ☐ White

5a. Is your ethnic heritage Hispanic? (22)
0 ☐ Yes
1 ☐ No

6. List in the table below all collegiate and graduate degrees, excluding honorary degrees, that have been awarded to you. Please check the pre-printed information, including the number and name of the specialty, from the Degree and Employment Specialties List on page 4, to be certain it is correct and complete.

Type of Degree	Granted Mo. Yr.	Major Field (Use Specialties List) Name Number	Institution Name	City (or Campus) & State
Bachelor's				
Master's				
Doctorate				
Other, specify				

7. What is your marital status? 1 ☐ Married 2 ☐ Not married (including widowed, divorced) (10)
   a. Do you have any children under 7 years of age? ☐ Yes ☐ No
   b. Do you have any children between 7 and 18 years of age? ☐ Yes ☐ No (11)

8. Are you physically handicapped? 0 ☐ Yes 1 ☐ No If YES, enter number(s) from below _____ (12)
   1. Visual 2. Auditory 3. Orthopedic 4. Other, specify _____ (13-16)

9. How many full-time equivalent years of professional work experience have you had? _____ Year(s) (17-18)
   a. How many full-time equivalent years, if any, involved teaching? _____ Year(s) (19-20)

10. **What was your employment status (includes postdoctoral appointment) during the week of FEBRUARY 11, 1979?** ☐ Enter number from below (21)

1. Employed full-time
2. Employed part-time
   If you were employed part-time, were you seeking full-time employment? ☐ Yes ☐ No (22)
3. Postdoctoral appointment†

†Temporary appointment in academia, industry or government, the primary purpose of which is to provide for continued education or experience in research.

If you held a postdoctoral appointment, was it: ☐ Full-time ☐ Part-time (23)

4. Unemployed and seeking employment
5. Not employed and not seeking employment
6. Retired and not employed
7. Other, specify _____

If you selected categories 4, 5, or 6 in Question #10, you have completed the questionnaire. Please return this form in the enclosed envelope.

11. **From the Degree and Employment Specialties List on page 4 select and enter both the number and title of the employment specialty most closely related to your principal employment or postdoctoral appointment during the week of FEBRUARY 11, 1979. Write in your specialty if it is not on the list.**

Number _____ Title of Employment Specialty _____ (24-26)

12. **If you were employed full-time during the week of FEBRUARY 11, 1979 in a specialty field other than your field of Ph.D., what was the MOST important reason for being in that position?** ☐ Enter number from below (27)

1. Preferred position outside Ph.D. field
2. Promoted out of position in Ph.D. field
3. Better pay
4. Locational factors
5. Position in Ph.D. field not available
6. Other, specify _____

13. **Please give the name of your principal employer (organization, company, postdoctoral institution, etc. or, if self employed, write "self") and actual place of employment during the week of FEBRUARY 11, 1979.**

Name of Employer _____ (28-33)

Number _____ Street _____

City _____ State _____ ZIP Code _____ (34-38)

14. **Which category below best describes the type of organization of your principal employment OR postdoctoral appointment during the week of FEBRUARY 11, 1979?** ☐ Enter number from below (39-40)

1. Business or industry (including self-employed)
2. Junior college, 2-year college, technical institute
3. Medical school (including university affiliated hospital or medical center)
4. 4-Year college
5. University, other than medical school
6. Elementary or secondary school system
7. Private foundation
8. Museum or historical society
9. Research library or archives
10. Hospital or clinic
11. U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA
12. U.S. government, civilian employee
13. State government
14. Local or other government, specify: _____
15. Non-profit organization, other than those listed above
16. Other, specify _____

15. **What percent of your professional work time did you devote to each of the following activities during the week of FEBRUARY 11, 1979?**

	%		%		%
		Management & Administration of			
1.	_____	(41) Research and development	7. _____	(53) Design	13. _____ (65) Curatorial work
2.	_____	(43) Educational programs	8. _____	(55) Teaching	14. _____ (67) Performing arts
3.	_____	(45) Other	9. _____	(57) Writing, editing	15. _____ (69) Quality control, inspection, testing
4.	_____	(47) Basic research	10. _____	(59) Professional services to individuals	16. _____ (71) Sales, marketing, purchasing, estimating
5.	_____	(49) Applied research			17. _____ (73) Other, specify _____
6.	_____	(51) Development of equipment, products, systems, data	11. _____	(61) Consulting	Total = 100%
			12. _____	(63) Production	

a. **What were your primary and secondary work activities?** (Enter number 1-17 from question #15 above) ☐ Primary (75-76) ☐ Secondary (77-78)

16. **What was the basic annual salary* associated with your principal professional employment during the week of FEBRUARY 11, 1979? If you were on a postdoctoral appointment (see question #10 for definition), what was your stipend plus allowances?** $_____ per year (10-12)

Check whether salary was for ☐ 9-10 months or ☐ 11-12 months (13)

*Basic salary is your annual salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, or other payment for professional work.

17. **What was your basic annual salary* for the year ending December 31, 1978?** $_____ per year. (14-16)
Check whether salary was for ☐ 9-10 months or ☐ 11-12 months. (17)

a. **What was your gross professional income** for the year 1978?** $_____ (18-20)

**Gross professional income is all payments received for professional activities including basic salary before deductions plus bonuses, consulting fees, honoraria, royalties, rental and subsistence allowances, etc.

18. If you were employed by an academic institution during the week of FEBRUARY 11, 1979, did you hold a tenured position? 0 ☐ Yes 1 ☐ No (21)

If YES, what year was tenure granted? _____ (22-23) If NO, did you hold a tenure-track position? 0 ☐ Yes 1 ☐ No (24)

19. If you were employed by an academic institution during the week of FEBRUARY 11, 1979, what was the rank of your position? ☐ Enter number from below (25)

FACULTY:

1. Professor
2. Associate professor
3. Assistant professor
4. Instructor
5. Other, specify _____

NONFACULTY:

6. Teaching staff
7. Research staff
8. Other, specify _____

20. Was any of your work during the week of FEBRUARY 11, 1979 supported or sponsored by U.S. Government funds?
0 ☐ Yes 1 ☐ No 2 ☐ Don't know (26)

If YES, which federal agencies or departments were supporting the work? _____ (27-60)
(Enter the number(s) from the List of Federal Supporting Agencies on page 4)

21. Listed below are selected topics of critical national interest. If you devoted a proportion of your professional time which you considered significant to any of these problem areas during the week of FEBRUARY 11, 1979, please give the corresponding number of the ONE on which you spent the MOST time.

☐ Enter number from below (61-62)

1. Energy or fuel
2. Health
3. Defense
4. Environ. protection, pollution control
5. Education (other than teaching)
6. Space
7. Crime prevention and control
8. Food and other agricultural products
9. Natural resources, other than fuel or food
10. Community development and services
11. Housing (planning, design, construction)
12. Transportation, communications
13. Cultural life
14. Other area, specify _____

a. Please enter your BEST estimate of the percent of your professional time during the week of February 11, 1979 that was devoted to this area of national interest.

☐ Enter number from below (63)

1. 100 percent
2. 75 to 99 percent
3. 50 to 74 percent
4. 25 to 49 percent
5. 24 percent or less

If you selected energy or fuel (category #1) in question #21, please provide the information requested in items #22, #23 and #24.

22. From the list below, give the corresponding number of the ONE energy source that involved the LARGEST proportion of your energy-related work during the week of FEBRUARY 11, 1979.

☐ Enter number from below (64)

1. Coal and coal products
2. Petroleum (including oil shale and tar sands) or natural gas
3. Fission
4. Fusion
5. Hydroenergy
6. Direct solar (including space and water heating, thermal, electric)
7. Indirect solar (winds, tides, biomass, etc.)
8. Geothermal
9. Other, specify _____

23. Please read the following list of energy-related activities and give the corresponding number(s) from the list below of the activity(ies) in which you were engaged during the week of FEBRUARY 11, 1979. Enter number(s) from below _____ (65-78)

1. Exploration
2. Extraction (gas, oil, mining)
3. Manufacture of energy-related components or products
4. Fuel processing (including refining and enriching)
5. Electric power generation
6. Transportation, transmission, distribution of fuel or energy
7. Energy storage
8. Energy utilization, management
9. Fuel reprocessing or disposal
10. Energy conservation
11. Environmental impact (health, economic, etc.)
12. Education, training
13. Research and development
14. Other, specify _____

24. Please enter the number 1-14 from item #23 that BEST describes the activity in which you spent MOST of your energy-related time. ☐ (79-80)

Thank you for completing this questionnaire. Please return the completed form in the enclosed envelope to the Commission on Human Resources, JH638, National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418.

DEGREE AND EMPLOYMENT SPECIALTIES LIST

MATHEMATICAL SCIENCES

000 - Algebra
010 - Analysis & Functional Analysis
030 - Geometry
036 - Logic
040 - Number Theory
052 - Probability
055 - Math. Statistics (see also 544, 670, 725, 727)
060 - Topology
062 - Operations Research (see also 478)
065 - Applied Mathematics
069 - Combinatorics & Finite Mathematics
091 - Physical Mathematics
095 - Mathematics, General
099 - Mathematics, Other*

COMPUTER SCIENCES

071 - Theory
072 - Software Systems
073 - Hardware Systems
074 - Intelligent Systems
079 - Computer Sciences, Other (see also 437, 476)

PHYSICS & ASTRONOMY

101 - Astronomy
102 - Astrophysics
110 - Atomic & Molecular Physics
120 - Electromagnetism
130 - Mechanics
132 - Acoustics
134 - Fluids
136 - Plasma Physics
138 - Optics
139 - Thermal Physics
140 - Elementary Particles
150 - Nuclear Structure
160 - Solid State
198 - Physics, General
199 - Physics, Other*

CHEMISTRY

200 - Analytical
210 - Inorganic
215 - Synthetic Inorganic & Organometallic
220 - Organic
225 - Synthetic Organic & Natural Products
230 - Nuclear
240 - Physical
245 - Quantum
250 - Theoretical
255 - Structural
260 - Agricultural & Food
265 - Thermodynamics & Material Properties
270 - Pharmaceutical
275 - Polymers
280 - Biochemistry (see also 540)
295 - Chemical Dynamics
298 - Chemistry, General
299 - Chemistry, Other*

EARTH, ENVIRONMENTAL AND MARINE SCIENCES

301 - Mineralogy, Petrology
306 - Geochemistry
310 - Stratigraphy, Sedimentation
320 - Paleontology
330 - Structural Geology
341 - Geophysics (Solid Earth)
350 - Geomorph. & Glacial Geology
391 - Applied Geol., Geol. Engr. & Econ. Geol.
395 - Fuel Tech. & Petrol. Engr. (see also 479)
380 - Hydrology & Water Resources
370 - Oceanography
387 - Marine Sciences, Other*
381 - Atmospheric Physics & Chemistry
382 - Atmospheric Dynamics
383 - Atmospheric Sciences, Other*
389 - Environmental Sciences, General (see also 480, 528)
389 - Environmental Sciences, Other*
390 - Earth Sciences, General
399 - Earth Sciences, Other*

ENGINEERING

400 - Aeronautical & Astronautical
410 - Agricultural
415 - Biomedical
420 - Civil
430 - Chemical
435 - Ceramic
437 - Computer
440 - Electrical
445 - Electronics
450 - Industrial & Manufacturing
455 - Nuclear
460 - Engineering Mechanics
465 - Engineering Physics
470 - Mechanical
475 - Metallurgy & Phys. Met. Engr.
476 - Systems Design & Systems Science (see also 072, 073, 074)
478 - Operations Research (see also 062)
479 - Fuel Technology & Petrol. Engr. (see also 395)
480 - Sanitary & Environmental
486 - Mining
487 - Materials Science Engr.
496 - Engineering, General
499 - Engineering, Other*

AGRICULTURAL SCIENCES

500 - Agronomy
501 - Agricultural Economics
502 - Animal Husbandry
503 - Food Science & Technology (see also 573)
504 - Fish & Wildlife
505 - Forestry
506 - Horticulture
507 - Soils & Soil Science
510 - Animal Science & Animal Nutrition
511 - Phytopathology
518 - Agriculture, General
519 - Agriculture, Other*

MEDICAL SCIENCES

520 - Medicine & Surgery
522 - Public Health & Epidemiology
523 - Veterinary Medicine
524 - Hospital Administration
526 - Nursing
527 - Parasitology
526 - Environmental Health
534 - Pathology
536 - Pharmacology
537 - Pharmacy
536 - Medical Sciences, General
539 - Medical Sciences, Other*

BIOLOGICAL SCIENCES

540 - Biochemistry (see also 280)
542 - Biophysics
543 - Biomathematics
544 - Biometrics and Biostatistics (see also 055, 670, 725, 727)
545 - Anatomy
546 - Cytology
547 - Embryology
548 - Immunology
550 - Botany
560 - Ecology
562 - Hydrobiology
564 - Microbiology & Bacteriology
566 - Physiology, Animal
567 - Physiology, Plant
569 - Zoology
570 - Genetics
571 - Entomology
572 - Molecular Biology
573 - Food Science & Technology (see also 503)
574 - Behavior/Ethology
576 - Nutrition & Dietetics
578 - Biological Sciences, General
579 - Biological Sciences, Other*

PSYCHOLOGY

600 - Clinical
610 - Counseling & Guidance
620 - Developmental & Gerontological
630 - Educational
635 - School Psychology
641 - Experimental
642 - Comparative
643 - Physiological
650 - Industrial & Personnel
660 - Personality
670 - Psychometrics (see also 055, 544, 725, 727)
680 - Social
698 - Psychology, General
699 - Psychology, Other*

SOCIAL SCIENCES

700 - Anthropology
703 - Archeology
706 - Communications*
709 - Linguistics
710 - Sociology
720 - Economics (see also 501)
725 - Econometrics (see also 055, 544, 670, 727)
727 - Social Statistics (see also 055, 544, 670, 725)
740 - Geography
745 - Area Studies*
751 - Political Science
752 - Public Administration
755 - International Relations
770 - Urban & Regional Planning
775 - History & Philosophy of Science
798 - Social Sciences, General
799 - Social Sciences, Other*

HUMANITIES

802 - History & Criticism of Art
804 - History, American
806 - History, European
808 - History, Other*
808 - American Studies
809 - Theater & Theater Criticism
830 - Music
831 - Speech as a Dramatic Art (see also 885)
833 - Religion (see also 881)
834 - Philosophy
836 - Comparative Literature
891 - Library & Archival Sciences
878 - Humanities, General
879 - Humanities, Other*

LANGUAGES & LITERATURE

811 - American
812 - English
821 - German
822 - Russian
823 - French
824 - Spanish & Portuguese
826 - Italian
827 - Classical*
829 - Other Languages*

EDUCATION & OTHER PROFESSIONAL FIELDS

801 - Art, Applied
881 - Theology (see also 833)
882 - Business Administration
883 - Home Economics
884 - Journalism
885 - Speech & Hearing Sciences (see also 831)
886 - Law, Jurisprudence
887 - Social Work
897 - Professional Field, Other*
899 - Other Fields*

938 - Education (other than teaching in a field listed above)

*Identify the specific field in the space on the questionnaire.

LIST OF FEDERAL SUPPORTING AGENCIES (For use with #28)

1. Agency for International Development
2. Environmental Protection Agency
3. National Aeronautics & Space Administration
4. National Endowment for the Arts
5. National Endowment for the Humanities
6. National Science Foundation
7. Nuclear Regulatory Commission
8. Smithsonian Institution
9. Department of Agriculture
10. Department of Commerce
11. Department of Defense
12. Department of Energy
13. National Institutes of Health (DHEW)
14. Alcohol, Drug Abuse & Mental Health Administration (DHEW)
15. National Institute of Education (DHEW)
16. Office of Education (DHEW)
17. Other DHEW, specify ____ _____
18. Department of Housing and Urban Development
19. Department of the Interior
20. Department of Justice
21. Department of Labor
22. Department of State
23. Department of Transportation
24. Other agency or department, specify _____
25. Don't know source agency

Appendix B
Weighting Procedure

Estimates in this report are based on weighted responses. The 2,040 individuals in the total sample of 51,711 who were known to be deceased or out-of-scope prior to the survey were excluded from the survey and weighted by their sample weight. The responses received from the survey sample (32,877) were assigned a response weight that is the product of the weight for nonresponse and the sample weight. Table B.1 shows the classification of the sample and the formulas used for calculating the weights.

Each stratum with fewer than two responses was merged with a similarly defined stratum in order to calculate sampling errors. Respondents in each stratum were assigned a weight equal to the integral part of the stratum's response weight, or the integral part plus one. Allocation of weights within a stratum was made at random so as to represent the stratum population. This technique avoids the necessity of rounding fractional estimates of totals.

For example, consider a stratum which contains 60 individuals of whom 15 were selected for the sample. One of the 15 is known to be deceased prior to the survey. This individual receives a sample weight, 60/15, or 4.0, and thus represents 4 individuals in the population. The number of survey sample cases in the stratum is 14. Of these 14 individuals, 10 responded. The average weight for the respondents in this stratum would be $[60/15] \cdot [14/10] = 5.6$. To obtain integer weights, 4 of the respondents, chosen at random, would each receive a weight of 5, thus representing 20 individuals in the population. The 6 remaining respondents would each receive a weight of 6, thus representing 36. Combined, the 10 respondents would represent 56 individuals in the stratum, who together with the 4 individuals who are estimated to be deceased represent the entire 60 individuals in the stratum.

Table B.1 Classification of Sample and Weighting for 1979 Survey of Doctorate Recipients

Group		Number in Sample	Type of Estimation Weight*
TOTAL SAMPLE		51,711	
EXCLUDED FROM SURVEY			
Known Deceased Prior to 1979 Survey**	1,621		Sample
Out-of-Scope			
Foreigns: Out-of Scope, Based on 1973 Survey Responses+	58		Sample
Fields: Out-of-Scope, Based on 1973 Survey Responses#	274		Sample
Fields: Out-of-Scope, Based on 1975 Survey Responses#	87		Sample
Total		2,040	
SURVEY SAMPLE		49,671	
Unable to Mail, No Valid Address		3,677	
CONTACTED SAMPLE		45,994	
RESPONSES			
Good Responses	32,543		Response
Known Deceased as a Result of the 1979 Survey	334		Response
Total		32,877	

* The sample weights (Ws) and response weights (Wr) for each stratum were computed as follows:

$$Ws_h = \frac{N_h}{n_h}$$, where N_h and n_h are the respective population and sample sizes of the stratum (h).

$$Wr_h = \frac{N_h}{n_h} \cdot \frac{\hat{n}_h}{r_h}$$, where $\hat{n}_h$ is the number of survey sample cases in the stratum and r_h is the number of survey responses in that stratum.

** Based on data obtained through 1973, 1975, or 1977 survey responses or through address searches.

\+ Based on responses that indicated individuals held Ph.D.'s from foreign institutions, were foreign citizens, and resided in foreign countries

\# Based on responses that indicated individuals held doctorates in education or professional fields and were employed in nonscience/nonengineering positions.

Appendix C
Sampling Error Estimates

The sampling error is a measure of the precision with which a statistic derived from a survey sample approximates the true population parameter being estimated. A confidence interval can be established around the sample statistic on the assumption that the sample statistic is normally distributed around the true population parameter. Under this assumption, the probability that the estimate lies within one sampling error of the actual parameter is about .67; within two sampling errors, about .95; and within three sampling errors, about .99. For example, given a survey estimate of 50 percent with a sampling error of 5 percent, one can infer that the likelihood that the true population parameter is between 45 and 55 percent is .67. There is a .95 likelihood that the estimate falls between 40 and 60 percent, and .99 likelihood between 35 and 65 percent.

Most of the statistics presented in this report are ratios of two weighted sums of responses to the 1979 Survey of Doctorate Recipients. As noted in Chapter 1, the SDR is a stratified random sample, that is, the population was divided into selected subgroups or strata. These subgroups were then sampled using variable sampling rates in order to provide sufficient coverage of small subgroups (such as racial/ethnic minorities and women). Sampling errors for such samples can be calculated using a formula which takes into account the number of survey respondents in each stratum of the sample.*

A useful approximation of the sampling errors of the statistics presented in percentage form in this report can be obtained from Table C.1. This table summarizes sampling errors associated with various proportion values at given sample sizes. Calculations in the table assume a simple random sample.

---

*See Appendix E, 1979 Profile, for a more detailed comparison of sampling error estimates based on a stratified random sample with those based on a simple random sample.

Values for Table C.1 were computed using the formula $s_p = \left(\frac{p[1-p]}{n}\right)^{\frac{1}{2}}$, in which p is the proportion of a particular category (variable) possessing a certain characteristic, y $\left(\text{i.e., } p = \frac{1}{n}\sum_{i}^{n} y_i\right)$, and n is the number of sample cases in the variable-specified category (e.g., doctoral scientists and engineers in the U.S. labor force). The finite population correction factor, fpc = $\left([N-n] / [N-1]\right)^{\frac{1}{2}}$, has been omitted from the calculations, since the fpc has negligible effect on the statistics in this report, except when the estimate applies to a subgroup that has a high sampling rate. In any case, the omission of the fpc in the formula for s_p yields a conservative estimate (i.e., a higher estimate) of the sampling error.

TABLE C.1 Approximate Sampling Errors for Various Statistics and Sample Sizes

Sample Size	Proportion				
	0.01 or 0.99	0.05 or 0.95	0.10 or 0.90	0.25 or 0.75	0.50
25,000	0.00063	0.00138	0.00190	0.00275	0.00316
12,100	0.00090	0.00198	0.00273	0.00394	0.00455
10,300	0.00098	0.00215	0.00296	0.00427	0.00493
9,000	0.00105	0.00230	0.00316	0.00456	0.00527
4,300	0.00152	0.00332	0.00457	0.00660	0.00762
2,400	0.00203	0.00445	0.00612	0.00884	0.01021
1,200	0.00287	0.00629	0.00866	0.01250	0.01443
800	0.00352	0.00771	0.01061	0.01531	0.01768
400	0.00497	0.01090	0.01500	0.02165	0.02500
200	0.00704	0.01541	0.02121	0.03062	0.03536
100	0.00995	0.02179	0.03000	0.04330	0.05000
50	0.01407	0.03082	0.04243	0.06124	0.07071
10	0.03146	0.06892	0.09487	0.13693	0.15811

The sample sizes for the subgroups on which the population estimates given in this report were based are given in Table C.2. These sample numbers can be used to construct approximate sampling errors for particular statistics mentioned in the report. This can be done either by using the formula for s_p or by referring to Table C.1 and making rough approximations of the sample size and percentage in proportion form. For example, in Table 2.4A, the total population of U.S.-born minority science and engineering Ph.D.s is 7,070. According to Table C.2, the sample size on which the estimate was based is 1,283. The sampling error of a reported statistic (for instance, 12.3 percent as the proportion of chemistry Ph.D.s among U.S.-born minority science and engineering Ph.D.s) can be estimated by using the formula for s_p or referring to Table C.1. In this case, $s_p = \left(\frac{0.123[1-0.123]}{1,283}\right)^{\frac{1}{2}} =$ 0.00917, or 0.9 percent. Similarly, the value in Table C.1 opposite 1,200 for 0.10 is 0.00866. The desired confidence interval can be constructed by multiplying the standard error by the appropriate coefficient: $\pm 1\ s_p$ will provide a 67 percent confidence interval, $\pm 2\ s_p$, approximately a 95 percent interval, etc.

SAMPLING ERROR ESTIMATES FOR MEDIAN SALARIES*

Salary medians were not reported when the sampling error for an estimated median salary exceeded ± $2,000. The following method was used to determine the sampling error of median salaries. From the estimated population distribution, a statistic, m, is computed that is an estimator of M, the position measure. When m is a median (p_m), the proportion of cases in the derived distribution falling below the position measure equals 0.5. The sampling error of p_m is estimated by

*The method for determining sampling errors of medians in this report was adapted from Hansen, Morris N., Hurwitz, William N., and Madow, William B. (1975) Sample Survey Methods and Theory, Vol 1, pp. 448-449. New York: John Wiley & Sons, Inc.

Table C.2 Sample Sizes of Selected Variable Bases of Science, Engineering, and Humanities Ph.D.s in the U.S. in 197

CATEGORY	REFERENCED IN TABLE	WHITES		MINORITIES								
				U.S. BORN					FOREIGN BORN			
		U.S. BORN	FRGN BORN	TOTAL	HISP	BLACK	ASIAN	AM IN	TOTAL	HISP	BLACK	ASIA
SCIENCE/ENGINEERING TOTAL	2.1, 2.2, 2.4A	18,806	2,041	1,283	269	598	289	127	1,460	122	41	1,29
HUMANITIES TOTAL	2.1, 2.2, 2.4B	4,055	634	442	115	245	40	42	260	130	21	10
1960-69 S/E Ph.D.s	2.2	5,631	665	156	33	55	50	18	345	12	4	32
1960-69 Humanities Ph.D.s	2.2	1,024	186	77	13	51	6	7	33	14	1	1
1970-78 S/E Ph.D.s	2.2, 2.3A	8,045	626	1,023	221	492	211	99	999	102	35	86
1970-78 Humanities Ph.D.s	2.2, 2.3B	2,274	359	315	96	157	31	31	219	112	20	8
1936-69 S/E Ph.D.s	2.3A	10,761	1,415	260	48	106	78	28	461	20	6	43
1936-69 Humanities Ph.D.s	2.3B	1,781	275	127	19	88	9	11	41	18	1	2
S/E Labor Force	2.5	17,457	1,901	1,242	264	577	278	123	1,413	118	40	1,25
Humanities Labor Force	2.5	3,632	575	416	114	226	36	40	247	125	20	9
S/E Ph.D.s, Total Employed	3.1, 4.1	16,452	1,800	1,133	236	544	235	118	1,262	110	39	1,11
S/E Ph.D.s, Male Employed	3.1, 4.1	11,759	1,281	735	180	302	168	85	823	69	26	72
S/E Ph.D.s, Women Employed	3.1, 4.1	4,693	519	398	56	242	67	33	439	41	13	36
Humanities Ph.D.s, Total Empl.	3.1, 4.1	3,490	540	402	107	224	33	38	229	115	18	9
Humanities Ph.D.s, Men Empl.	3.1, 4.1	1,960	253	200	50	113	10	27	109	49	10	5
Humanities Ph.D.s, Women Empl.	3.1, 4.1	1,530	287	202	57	111	23	11	120	66	8	4
S/E Ph.D.s												
Employed 1960-69 Ph.D.s	3.2, 4.2	5,347	631	146	31	50	48	17	331	12	4	31
Employed 1970-78 Ph.D.s	3.2, 4.2	6,943	523	896	191	452	160	93	829	91	34	70
Humanities Ph.D.s												
Employed 1960-69 Ph.D.s	3.2, 4.2	1,960	253	200	50	113	10	27	109	49	10	5
Employed 1970-78 Ph.D.s	3.2, 4.2	1,530	287	202	57	111	23	11	120	66	8	4
Academically Employed												
S/E Ph.D.s	3.3, 3.5	9,570	1,080	670	145	321	130	74	615	47	26	5
Humanities Ph.D.s	3.3, 3.5	2,898	460	330	87	184	29	30	202	102	17	4
Chemistry Ph.D.s Empl.	3.4, 4.4	1,657	221	121	24	57	29	11	205	19	4	1
Engineering Ph.D.s Empl.	3.4, 4.4	1,068	190	43	14	12	13	4	205	5	1	1
Social Scis. Ph.D.s Empl.	3.4, 4.4	1,832	209	211	47	114	29	21	116	16	12	3
History Ph.D.s Empl.	3.4, 4.4	496	40	76	19	46	4	7	23	5	4	1
Mod. Languages Ph.D.s Empl.	3.4, 4.4	668	305	104	54	34	9	7	121	91	4	1
Academically Employed												
1960-78 S/E Ph.D.s	3.7, (3.6 close)	7,124	685	620	138	296	114	72	556	45	25	4
1960-78 Humanities Ph.D.s	3.7, (3.6 close)	2,383	379	282	75	158	24	25	174	85	16	3
Nonacademically Employed												
S/E Ph.D.s	4.3, 4.5, 4.6	6,805	705	458	89	221	104	44	641	61	13	5
Humanities Ph.D.s	4.3, 4.5, 4.6	568	70	62	17	33	4	8	26	13	1	1

the formula $s_{p_m} = \left(\frac{p_m[1-p_m]}{n}\right)^{\frac{1}{2}}$. Two additional proportions are then computed:

$$p_1 = p_m - k s_{p_m}$$

$$p_2 = p_m + k s_{p_m}$$

The confidence interval for the median is set by calculating m_1 and m_2, the values below which p_1 and p_2 of the population distribution fall. The level of confidence is determined by k and will be about 67 percent when k = 1, and approximately 95 percent when k = 2. Because the values of m_1 and m_2 depend on the variability of the distribution, it must be noted that the corresponding values for 2 standard errors are not necessarily twice those for 1 standard error. In this report a confidence interval of 1 standard error was used to determine the median salaries that would be reported.